Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

SHOUT
SHARE
IT

UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT BULLETIN No. 1188

Washington, D. C. ▼ April 9, 1924

COSTS AND FARM PRACTICES IN PRODUCING POTATOES

on 461 Farms in Minnesota, Wisconsin, Michigan New York, and Maine for the Crop Year, 1919

By

W. C. FUNK, Assistant Farm Economist
Bureau of Agricultural Economics

CONTENTS

	Page
Introduction	1
Geographic Distribution of Potato Production	2
Production and Price Trends	5
Conditions Peculiar to Surplus Production of Potatoes	7
Costs and Practices in 1919 on Specific Farms	9
Labor and Material Used per Acre	12
Cost of Production	13
Variation in Cost per Acre	14
Variation in Cost per Bushel	15
Relation of Yield to Cost per Bushel	15
Analysis of Items of Cost—	
Labor	16
Materials	33
Use of Land	35
Machinery	35
Overhead	36
Other Costs	36
Tenure	37
Relation of Costs and Prices, 1913-1921	37

WASHINGTON
GOVERNMENT PRINTING OFFICE
1924

UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT BULLETIN No. 1188

Washington, D. C. ▼ April 9, 1924

COSTS AND FARM PRACTICES IN PRODUCING POTATOES

On 461 Farms in Minnesota, Wisconsin, Michigan, New York, and Maine for the Crop Year 1919

By W. C. FUNK, *Assistant Farm Economist, Bureau of Agricultural Economics.*

CONTENTS.

	Page.		Page.
Introduction	1	Relation of yield to cost per bushel	15
Geographic distribution of potato production	2	Analysis of items of cost—	
Production and price trends	5	Labor	16
Conditions peculiar to surplus production of potatoes	7	Materials	33
Costs and practices in 1919 on specific farms	9	Use of land	35
Labor and material used per acre	12	Machinery	35
Cost of production	13	Overhead	36
Variation in cost per acre	14	Other costs	36
Variation in cost per bushel	15	Tenure	37
		Relation of costs and prices, 1913–1921	37

INTRODUCTION.

This bulletin presents data on costs and farm practices in the production of potatoes in nine surplus-producing areas in Maine, New York, Michigan, Wisconsin, and Minnesota; the relation of production in these areas to the production of the entire country; and the trends of production, prices, and costs for the past quarter century.

Over a series of years, considerable variations exist in acreage, yield, prices, and production costs, and a knowledge of the variations which have occurred in these factors and trends at the time the investigation was made should enable the individual grower to apply more intelligently the information contained herein to his own conditions.

Good business management on the part of the producer involves not only a thorough understanding of production costs and practices, but also an understanding of the forces and conditions governing the market.

56856°—24——1

GEOGRAPHIC DISTRIBUTION OF POTATO PRODUCTION.

ACREAGE.

The potato crop is widely distributed throughout the United States. The larger part of the commercial crop, however, is confined to relatively limited areas particularly suited to its production. The leading potato States in order of acreage are New York, Michigan, Wisconsin, Minnesota, Pennsylvania, and Maine. (See Table 1.). The major portion of the crop is grown north of a line running through Washington, D. C., and Chicago. (See fig. 1.)

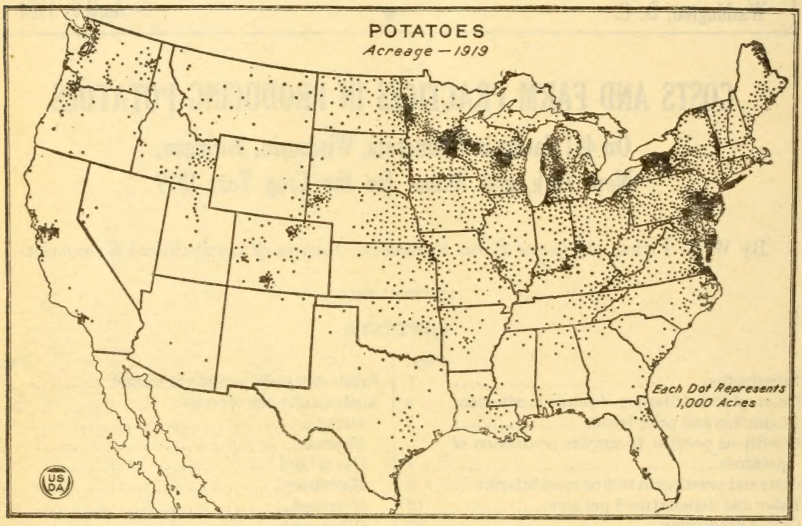

FIG. 1.—Potatoes are grown throughout the United States, but mainly in the northern tier of States. Elsewhere the areas of heavy production are small and widely scattered.

A relatively small proportion of the improved land in farms, for the four leading potato States, was in potatoes—only about 1.5 per cent. It is thus fairly easy to increase or decrease the potato acreage appreciably in these States. Table 1 shows that in individual States this variation does take place. In New York, for instance, the acreage in 1917 was one-fourth greater than in 1916. A large increase will also be noticed in Maine for 1917. The variation in total acreage for the United States is not so marked for successive years, indicating that the forces causing changes in acreages do not have the same effect in all States in any one year. (See fig. 2.)

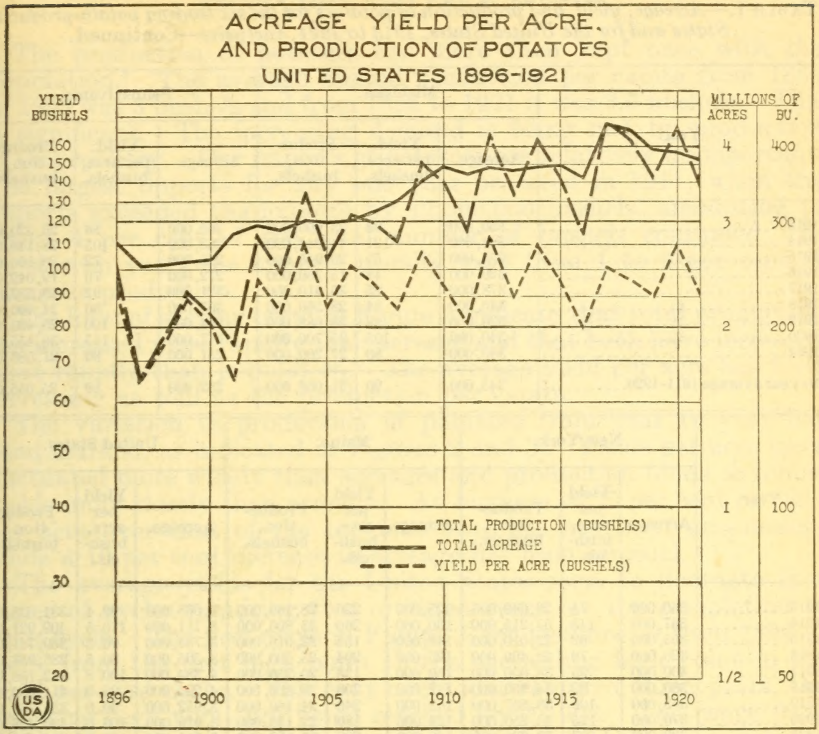

FIG. 2.—The acreage of potatoes reached a maximum in 1917, while total production has varied greatly under the influence of the yields per acre.

TABLE 1.—*Acreage, yield, and production of potatoes for the six leading potato-producing States and for the United States,*[1] *1913 to 1921, inclusive.*

Year.	Minnesota.			Wisconsin.		
	Acreage.	Yield per acre, bushels.	Production, bushels.	Acreage.	Yield per acre, bushels.	Production, bushels.
1913	275,000	110	30,250,000	295,000	109	32,155,000
1914	270,000	114	30,780,000	304,000	124	37,696,000
1915	285,000	106	30,210,000	298,000	87	25,926,000
1916	280,000	60	16,800,000	290,000	47	13,630,000
1917	300,000	112	33,600,000	307,000	114	34,998,000
1918	312,000	105	32,760,000	295,000	112	33,040,000
1919	300,000	87	26,100,000	300,000	94	28,200,000
1920	295,000	95	28,025,000	308,000	108	33,264,000
1921	367,000	75	27,525,000	315,000	68	21,420,000
10-year average 1911-1920	279,000	104	28,748,000	297,000	103	30,631,000

[1] Yearbook United States Department of Agriculture.

TABLE 1.—*Acreage, yield, and production of potatoes for the six leading potato-producing States and for the United States, 1913 to 1921, inclusive*—Continued.

Year.	Michigan.			Pennsylvania.		
	Acreage.	Yield. per acre, bushels.	Production, bushels.	Acreage	Yield. per acre, bushels.	Production, bushels.
1913	350,000	96	33,600,000	265,000	88	23,320,000
1914	364,000	121	44,044,000	268,000	105	28,140,000
1915	355,000	59	20,945,000	280,000	72	20,160,000
1916	320,000	48	15,360,000	272,000	70	19,040,000
1917	378,000	95	35,910,000	321,000	92	29,532,000
1918	340,000	84	28,560,000	305,000	80	24,400,000
1919	326,000	88	28,688,000	254,000	100	25,400,000
1920	340,000	105	35,700,000	317,000	115	36,455,000
1921	340,000	80	27,200,000	251,000	86	21,586,000
10-year average 1911–1920	345,000	90	31,058,000	282,000	89	25,055,000

Year.	New York.			Maine.			United States.		
	Acreage.	Yield per acre, bushels.	Production, bushels.	Acreage.	Yield per acre, bushels.	Production, bushels.	Acreage.	Yield per acre, bushels.	Production bushels.
1913	360,000	74	26,640,000	128,000	220	28,160,000	3,668,000	90.4	331,525,000
1914	367,000	145	53,215,000	130,000	260	33,800,000	3,711,000	110.5	409,921,000
1915	355,000	62	22,010,000	142,000	155	22,010,000	3,734,000	96.3	359,721,000
1916	320,000	70	22,400,000	125,000	204	25,500,000	3,565,000	80.5	286,953,000
1917	400,000	95	38,000,000	150,000	135	20,250,000	4,384,000	100.8	442,108,000
1918	380,000	92	34,960,000	112,000	200	22,400,000	4,295,000	95.9	411,860,000
1919	363,000	109	39,567,000	102,000	240	24,480,000	3,952,000	90.0	355,773,000
1920	370,000	125	46,250,000	123,000	180	22,140,000	3,929,000	109.6	430,458,000
1921	330,000	103	33,990,000	129,000	288	37,152,000	3,815,000	90.9	346,823,000
10-year average 1911–1920	365,000	96	34,895,000	125,000	199	24,315,000	3,857,000	97	374,170,000

PRODUCTION.

The six leading potato-producing States harvest nearly half the total crop of the country. No direct tendency toward increased production has been observed in these States during the nine years 1913 to 1921, inclusive. The acreage increased in Wisconsin and Minnesota, but lower yields held down the total production. Production has increased in a few of the Southern States, notably Virginia. Centers of production, however, have not changed materially during the past nine years.

YIELDS PER ACRE.

Maine regularly leads in yield per acre, a result of climate and soils admirably adapted to potato production and the use of large quantities of commercial fertilizers. The average yields of New York, Wisconsin, and Minnesota were practically the same during the nine-year period. Yields were somewhat higher in New Jersey than in the States just mentioned, while those of Pennsylvania and the Central Western States were appreciably lower. In the extreme Western States, where the crop is raised mainly under irrigation, high yields are obtained. Idaho leads these Western States with a nine-year average yield of 162 bushels per acre, which is considerably below Maine's average of 204 bushels.

PRODUCTION AND PRICE TRENDS.

The production of potatoes has more than kept pace with the population.[2] The average annual production per capita from 1869 to 1895 was 3 bushels and from 1896 to 1921 it was 3.5 bushels. This is significant. The increasing demand is being met by production in this country. Our imports of potatoes are relatively unimportant. The largest imports for any one year occurred in 1911, when the imports exceeded the exports by 12,500,000 bushels, amounting to about 4 per cent of the total number of bushels consumed. In short crop years the imports usually vary from 1 to 2 per cent of domestic production.

The lines of secular trend in Figure 3 indicate that total production has increased more rapidly than acreage and that both have increased more rapidly than population. The average yield per acre has been increasing as well as the production per capita.

The variation in production of potatoes from year to year has been marked, as indicated in Figures 2 and 3. Yields per acre have fluctuated more widely than acreages and production tends to follow yields more closely than acreage. An increase of 25 per cent in yield per acre over that of the previous year has not been uncommon, while a 10 per cent increase in acreage has been unusual.

The average yields for the United States seem to fluctuate in a series of cycles requiring two or three years for the completion of each cycle. The first cycle in Figure 2, for instance, is from 1896 to 1899, from the first high point to the succeeding high point in the yield-per-acre curve. The next cycle also required three years, the following high point not being reached until 1902. The range from the high to the low points of the cycles varies, but the regularity with which they occur is of more than passing interest. The striking thing is that the production varies consistently with the yield per acre and practically as widely. The acreage varies from year to year, but not as markedly as the yield per acre. In 75 per cent of the variations the yield moves in the same direction as the acreage, indicating that the factors which induce increase in acreage also influence the grower to work for a better yield.

The yields per acre in individual States (fig. 2) do not always move in the same direction as the United States yields. In 1919, for instance, when the United States yield was 93 per cent of the 10-year average, the Maine yield was 121 per cent, and in 1917, when the United States yield was 104 per cent, the Maine yield was 68 per cent. Similar variations may be noted in other States.

The farm price [3] per bushel varies inversely with the total production (see fig. 4) with few exceptions. The big variation in production for different years has been pointed out. When the production is relatively high the average price is relatively low and vice versa. It is the total production of the country that determines the price and not the production of any one State. Years of high potato prices

[2] The relations that have existed in the past between population, potato production, acreage, yields per acre, and price per bushel are shown in Figures 2, 3, and 4. A logarithmic scale was used in Figures 2 and 4, so that equal proportional changes are represented by equal vertical distances on the chart. An arithmetic scale was used in Figure 3, and the straight lines represent the long-time (secular) trend of potato production and acreage.

[3] The farm price is the Dec. 1 price as published by the United States Department of Agriculture.

have usually been followed by years of high production, resulting in low prices for those years, and conversely years of low prices have been followed by years of low production. (See fig. 4.) For the 25 years shown in this chart there were only seven exceptions to this rule.

The acre value of the crop does not vary as widely as the production or the bushel price. This is to be expected, since yield is usually

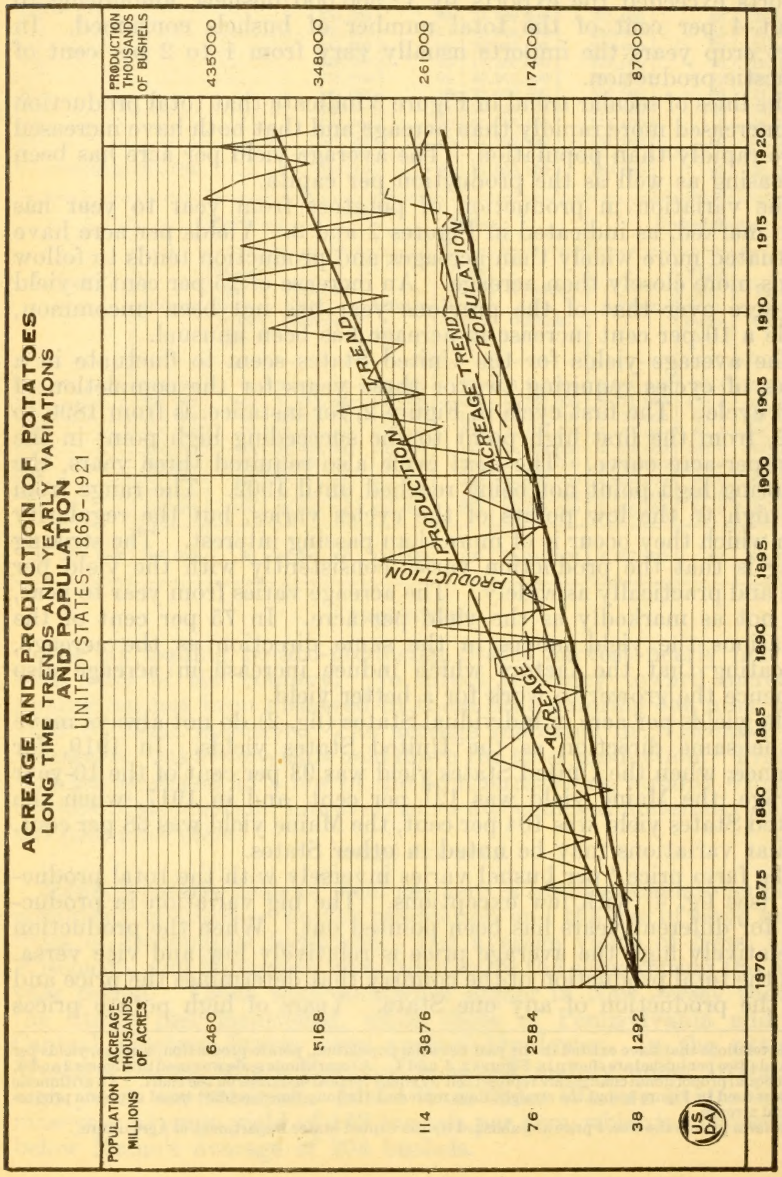

FIG. 3.—The acreage of potatoes has been increasing slightly faster than the population. Production has increased much faster than population though the annual fluctuations in production are wide, and tend to obscure the relations of the movements in short periods of time.

high when the price is low. The variations observed, however, are more generally in the direction of the price fluctuations than in the direction of the yield or the production fluctuations. The acre value for individual areas or individual farmers will increase or decrease in relation to the deviation from the United States yield. The price per bushel and the acre value for the United States have been gradually increasing since 1896, and, of course, they assumed a much higher level during the World War period, due to the increase in the general price level.

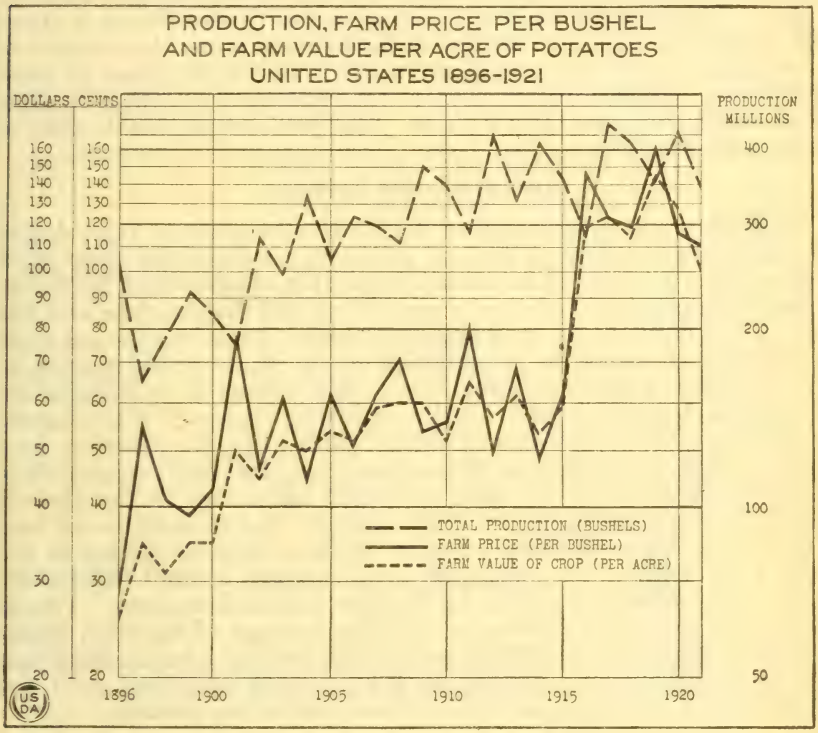

FIG. 4.—The influence of changes in total production of potatoes on the farm price from year to year is marked. The farm value per acre of potatoes is further affected by the yields per acre.

CONDITIONS PECULIAR TO SURPLUS PRODUCTION OF POTATOES.

Potatoes are raised in every State, but there are only about six States in which potato growing is consistently profitable enough to encourage an annual surplus of significant proportions. Combinations of conditions prevail in these areas of surplus production which result in a cost per bushel, year after year, too low for other areas to meet successfully on any great quantity of potatoes.

The fact that the annual crop of potatoes must be sold within the year, usually within nine months, and that in a good season the total production may easily be so large that it can be disposed of by growers only at a price which makes potatoes a comparatively cheap food, makes it relatively unprofitable, over most of the country, to grow more than local supplies, or a part of local supplies, and tends

to localize the surplus production in those areas where the cost on the farm is relatively low and where the cost of transportation to consuming centers is also relatively low. To be relatively profitable, therefore, the following conditions must usually obtain: (1) A low unit cost of production; (2) a freight rate which will leave an acceptable margin to growers at their shipping point.

COST OF PRODUCTION.

Low cost per bushel is the result of low cost per acre with ordinary yields, or with increasingly higher yields, as the cost per acre increases. The average yield of potatoes in the United States is about 100 bushels to the acre, but, as will be shown later, the growers of Aroostook County, Me., with costs per acre double those of most other areas, produce the crop at a cost per bushel as low as in most other areas, because their average yield per acre is double that of these other districts.

TRANSPORTATION CHARGES.

Without going into complete details with respect to the relation of transportation charges to farm prices for potatoes and their effect on localizing production in certain areas, it is obvious that the transportation charges, which are a product of the freight rate and the distance to the market, are a limiting factor. Thus, with equal costs per bushel at the farm or shipping point, those areas nearest to market have a distinct advantage. The effect of transportation charges on the distribution of the crop is illustrated by the figures in Table 2. The shippers in Cadillac, Mich., are, for example, at a disadvantage in shipping to Chicago as compared with central Wisconsin shippers, but they have a distinct advantage in the Detroit and Pittsburgh markets. In 1920 and 1921 the Maine growers had a differential of 18.6 cents a bushel against them in selling in the New York market as compared with shippers around Rochester, N. Y., but had an advantage in the New England markets. Potato growers in the South overcome the disadvantage of the high transportation charges to northern consuming centers because thay can put their crop on the market at a high price compared with the stocks out of storage from the northern producing centers.

TABLE 2.—*Freight rates of potatoes per bushel in carload lots.*

	Freight rates per bushel.		Distance.		Freight rates per bushel.		Distance.
	1919–1920	1920–1921			1919–1920	1920–1921	
Cadillac, Mich., to—	*Cents.*	*Cents.*	*Miles.*	Presque Isle, Me., to—	*Cents.*	*Cents.*	*Miles.*
Detroit	13.8	19.5	200	Boston	18.9	26.4	438
Chicago	15.3	21.6	287	Providence	21.0	29.4	483
Cincinnati	17.1	24.0	446	New Haven	22.5	31.5	597
Pittsburgh	18.0	25.5	521	New York City	25.5	35.7	673
Waupaca, Wis., to—				Rochester, N. Y., to New			
Chicago	10.2	15.0	221	York City	.....	17.1	373
St. Louis	15.0	20.4	595				
Cincinnati	15.9	21.3	519				
Pittsburgh	19.8	26.4	689				

It will be observed in Figure 1 that large potato-producing areas are relatively near the most densely populated sections. The greatest number of large cities are located north of the latitude 39° and east of the ninety-seventh meridian. The most important potato-producing sections are also located within these limits. Potatoes constitute a bulky and perishable product, so that long hauls on railroads are not always profitable. Similarly, farms located long distances from the shipping station are seriously handicapped with high marketing costs.

COSTS AND PRACTICES IN 1919 ON SPECIFIC FARMS.

GENERAL CONDITIONS.

It has been pointed out that factors affecting the cost of producing a bushel of potatoes in different parts of the country vary

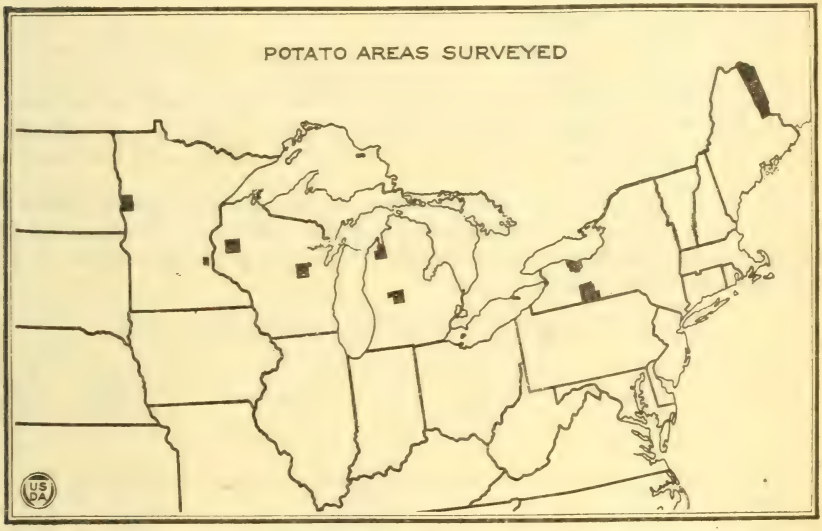

FIG. 5.—Nine counties in the areas of heaviest production were selected for study, together representing the conditions and practices prevailing in the production of potatoes over most of the northern humid regions.

considerably. Detailed costs and farm practices involved in potato production in nine different areas were studied in 1919 in order to show the effect of these differences. About 50 farmers were visited in each of these nine areas in the course of collecting the data presented in the following pages. The data apply to the crop year 1919. The areas studied are located in the following counties and States: Clay and Anoka Counties, Minn.; Barron and Waupaca Counties, Wis.; Grand Traverse and Montcalm Counties, Mich.; Monroe and Steuben Counties, N. Y.; and Aroostook County, Me. (See fig. 5.)

CLIMATIC CONDITIONS.

The precipitation for the months of the growing season, 1919, is shown in Table 3. The deviation of the 1919 rainfall from the normal was considerable in a few of the areas for some months. The

distribution of the rainfall throughout the month could not be shown, although this may be important in affecting yields, for there may be excessive rain for a short period of the month and no rain the rest of the month.

TABLE 3.— *Rainfall in 1919 and normal rainfall during growing season.*

State and county.	Station.	May.		June.		July.		August.		September.		July to September, 1919.	November.
		1919	Normal.	1919	Normal.	1919	Normal.	1919	Normal.	1919	Normal.		
Minnesota:													
Clay County	Moorhead	4.01	2.95	2.50	4.13	5.56	3.74	2.83	3.10	1.34	2.30	9.73	9.14
Hennepin County	Minneapolis	1.71	3.92	4.04	4.01	6.19	3.81	1.88	3.69	1.47	3.66	9.54	11.16
Wisconsin:													
Waupaca County	Waupaca	5.71	4.43	6.38	4.12	3.12	3.70	3.69	3.42	3.69	3.87	10.50	10.99
Barron County	Barron	1.57	4.28	4.28	4.53	8.55	4.07	4.39	3.58	1.94	3.23	14.88	10.88
Michigan:													
Montcalm County	Howard City	2.29	.....	4.27	.....	1.35	.....	1.77	.....	3.56	.....	6.68	.....
Grand Traverse County	Old Mission	4.75	3.22	1.21	2.51	3.28	2.61	.70	3.17	3.49	3.31	7.47	9.09
New York:													
Steuben County	Haskinville	8.17	3.26	5.09	3.38	2.87	4.14	4.45	3.54	1.49	2.86	8.81	10.54
Monroe County	Rochester	5.20	2.44	2.96	3.13	3.40	3.09	3.60	2.96	1.26	2.32	8.26	8.37
Maine: Aroostock County	Houlton	3.26	2.18	1.87	3.29	1.57	2.56	.46	2.80	4.48	2.80	6.51	8.16

The dates of the last killing frost in the spring and of the first killing frost in the fall in 1919 are shown in Table 4. These data are of importance in comparing the length of the growing season in the different sections studied.

TABLE 4.—*Dates of last killing and first killing frosts, 1919.*

State.	County.	Last killing frost.	First killing frost.
Minnesota	Clay	May 5	Oct. 10
	Hennepin	Apr. 25	Oct. 11
Wisconsin	Waupaca	Apr. 29	Oct. 11
	Barron	May 8	Oct. 7
Michigan	Montcalm	May 18	Sept. 31
	Grand Traverse	May 13	Oct. 20
New York	Monroe	Apr. 26	Nov. 10
Maine	Aroostock	June 23	Sept. 16

The 1919 yields on the farms studied were within 10 per cent of the average yield for the five preceding years in all areas excepting that of Monroe County, N. Y., where the 1919 yield was only 72 per cent of the normal. The low yield in this county was due primarily to the fact that the early part of the season was very wet and the latter part dry.

CROPS AND LIVE STOCK PRODUCED.

The area devoted to different crops in 1919 on the farms studied is shown in Table 5. Sixteen per cent of the crop acreage was devoted to potatoes, and for the several regions this percentage varied from 12 in Grand Traverse County, Mich., to 28 in Aroostock County, Me.

TABLE 5.—*Distribution of crop area (461 farms).*

	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay County.	Anoka County.	Barron County.	Waupaca County.	Montcalm County.	Grand Traverse County.	Steuben County.	Monroe County.	Aroostook County
Crop acres per farm	361	84	64	66	86	79	88	75	100
Per cent of crop area in—									
Potatoes	13.9	19.2	12.6	18.6	12.1	12.0	12.7	14.5	28.2
Wheat	48.6	16.7	3.9	2.2	11.7	6.3	5.9	22.9	1.8
Hay	6.7	23.5	30.8	29.1	19.9	30.2	47.2	27.6	47.2
Oats	14.6	13.8	27.8	22.8	14.1	15.3	20.8	12.6	20.0
Corn	6.0	15.4	10.3	12.7	16.7	16.4	3.8	9.9	.2
Rye	.3	10.7	5.1	8.5	19.8	10.4	1.6	2.9	.....
Barley	7.0	.6	5.1	2.8	.8	.1	1.8	3.9	.8
Buckwheat	.....	.....	.4	.....	.2	.6	4.9	.....	1.2
Flax	2.3	.....	.4	.....	.....	.....	.....	.....	.....
Beans	.....	.....	.....	.....	3.6	1.9	.3	.4	.....
Miscellaneous	.6	.1	3.6	3.3	1.1	6.8	1.0	5.3	.6

A fairly definite rotation of crops is followed in all the areas except in Clay County, Minn. Wheat, oats, and potatoes constitute the most important crops in this district and are not grown in any definite successions. In the other areas potatoes invariably follow clover or some other hay crop. Where corn is grown it follows potatoes; in other places a small grain follows. Corn is followed by a grain which is seeded to grass and completes the rotation. The most common short rotation is potatoes, wheat or oats, and clover.

The proportion of the farm receipts secured from different sources is shown in Table 6. Potatoes constituted the most important source of income in each area; in the Maine area, 94.5 per cent being derived from this source, and in the other areas ranging from 41.5 per cent in Barron County, Wis., to 64.8 per cent in Grand Traverse County, Mich. High prices were realized for potatoes in 1919 (see fig. 4) and consequently the proportional returns from the crop were relatively high.

TABLE 6.—*Proportion of farm receipts secured from different sources.*

Source of receipts.	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay County.	Anoka County.	Barron County.	Waupaca County.	Montcalm County.	Grand Traverse County.	Steuben County.	Monroe County.	Aroostook County
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Potatoes	61.7	57.8	41.5	56.8	50.1	64.8	61.5	45.3	94.5
Wheat	24.6	8.6	.7	.6	9.0	1.7	4.1	16.9	.....
Other crops	2.6	4.5	9.0	.9	13.2	9.6	9.5	15.0	3.2
Total crops	88.9	70.9	51.2	58.3	72.3	76.1	75.1	77.2	97.7
Livestock	4.7	12.9	16.0	9.1	12.2	11.1	6.6	10.5	1.1
Livestock products	6.0	15.4	32.7	32.5	15.4	12.0	18.0	12.3	1.2
Total livestock and products	10.7	28.3	48.7	41.6	27.6	23.1	24.6	22.8	2.3
Miscellaneous	.4	.8	.1	.1	.1	.8	.3	.....	.....

The relatively high receipts from potatoes in the Maine area were due chiefly to the high value of the potato crop per acre in 1919. Ninety-five per cent of the total receipts were secured from 28 per

cent of the crop area. Exceptionally high yields were obtained in 1919 and the price received was also high. The other crops, mainly hay and oats, were raised for feeding the stock and the small surplus of these crops sold gave relatively low returns per acre.

The livestock receipts were mainly from dairy cows, This is natural, since dairying and potato raising are carried on under similar climatic conditions and within reasonable distance of the large markets. Potatoes and dairy cows make a good combination from the farm organization point of view, as the cows consume roughage, furnish manure for the potato crop, and give opportunity for productive winter labor.

Livestock plays an important part in maintaining soil fertility in these regions. It utilizes the clover or other legumes that are grown in the rotation, thus permitting valuable plant food to be returned to the soil.

LABOR AND MATERIAL USED PER ACRE.

The average number of hours of labor spent per acre in potato production vary considerably in the different areas, as shown in Table 7. In Clay County, Minn., and Aroostook County, Me., the picking was usually done by contract labor, this work being paid for by the bushel or barrel. Information regarding the hours of labor required for this work was not obtained from sufficient growers to make the data usable for these areas. The normal yield, as given in Table 7, is the average of the farmers' estimates of what they considered normal yields for their farms. The county yields as obtained from census data are consistently lower than the yields of the farms studied for these States. This is to be expected, because the growers visited were located in areas where commercial growing had proved successful, while the county acreage includes potatoes grown in all types of soil by all kinds of growers.

TABLE 7.—*Labor and material used per acre (461 farms) 1919—Potatoes.*

	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay Co.	Anoka Co.	Barron Co.	Waupaca Co.	Montcalm Co.	Grand Traverse Co.	Steuben Co.	Monroe Co.	Aroostook Co.
Number of farms	51	54	47	50	49	52	50	50	58
Man labor ....hours..	[1] 29.2	63.7	92.7	77.4	73.9	90.2	87.1	85.6	[1] 77.6
Horse labor....hours..	65.7	86.9	100.3	77.2	85.5	78.0	98.4	116.0	110.0
Manure[3]....tons..	14.1	13.9	17.9	12.7	12.9	12.3	12.1	15.7	10.4
Fertilizer[3]....pounds..	.....	.....	500	.....	421	.....	606	387	1,980
Seed....bushels..	12.3	9.5	11.6	10.6	7.7	11.3	11.2	13.2	15.4
Acre yield, 1919....bushels..	103	104	152	123	109	124	141	110	278
Acre yield, normal....bushels..	100	111	146	134	117	132	134	153	256
Average potato acres per farm	50	16	8	12	10	10	11	11	28
Potato-land acre ....value..	$140	$199	$179	$161	$124	$117	$80	$192	$182
County yields:[2]									
1919	88	93	126	116	93	102	114	90	252
1909	91	117	136	121	106	111	107	138	231

[1] Picking time was not included, largely contract.
[2] Bureau of the Census, Department of Commerce.
[3] Quantity of manure and fertilizer is the average only for the acres to which it is applied.

COST OF PRODUCTION.

A summary of the important items of cost in the production of an acre of potatoes for the areas studied is found in Table 8. The items of cost were charged at the rates prevailing during the year 1919. The yields used in computation were those obtained that year in each section.

TABLE 8.—*Average cost per acre and per bushel of potatoes, 1919, 461 farms, 8,161.5 acres.*

	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay Co.	Anoka Co.	Barron Co.	Waupaca Co.	Montcalm Co.	Grand Traverse Co.	Steuben Co.	Monroe Co.	Aroostook Co.
Number of farms	51	54	47	50	49	52	50	50	58
Total acres planted	2,558	870	381	614	508	497.5	560.5	539.5	1,633
Total production.....bushels.	260,302	90,012	57,790	75,419	55,216	61,298	79,046	59,245	414,332
Average yield per acre harvested..bushels.	103	104	152	123	109	124	141	110	278
Labor:									
Man labor	$19.93	$22.08	$31.90	$24.52	$23.85	$27.60	$26.30	$27.62	$41.88
Horse labor	15.05	16.85	19.99	15.26	16.91	15.44	23.67	27.34	25.44
Material costs:									
Manure	3.95	8.62	13.80	12.28	13.31	11.81	11.25	14.87	4.72
Seed	12.55	11.21	12.22	12.26	7.62	11.91	11.18	13.89	21.86
Fertilizer	.....	.....	.15	.....	.10	.....	1.81	1.68	79.90
Spraying	1.24	2.47	3.06	1.99	1.95	1.73	1.31	1.00	4.57
Seed treatment	.08	.10	.12	.....	.04	.....	.07	.01	.....
Machinery	5.39	7.48	8.06	6.29	7.11	6.17	7.85	9.40	9.10
Use of land	8.39	11.95	10.72	9.67	7.44	7.04	4.79	11.54	10.93
Overhead	2.64	3.06	4.87	3.98	3.83	4.11	6.05	6.92	14.27
Other costs:									
Taxes	1.32	1.20	1.71	1.26	1.50	1.49	.95	1.31	1.82
Fire insurance	.06	.12	.12	.12	.17	.16	.17	.25	.24
Bags and barrels	3.98	1.41	.32	.29	.23	.63	.50	.63	2.70
Storage—									
Fuel	.08	.09	.....	.05	.05	.....	.15	.01	.71
Cash	.68	.05	.21	.....	.....	1.08	.03	.....	.28
Use potato building	1.72	1.09	.13	.05	.23	.16	.06	.38	1.00
Crop insurance	.24	.....	.03	.06	.....	.....	.....	.....	.18
Loss on abandoned acreage	.79	.49	.19	.....	.....	.52	.....	.....	.....
Total cost per acre	78.09	88.27	107.60	88.08	84.34	89.85	96.14	116.85	219.60
Total cost per bushel	.76	.85	.71	.72	.78	.72	.68	1.06	.79
Not including a land charge:									
Cost per acre	69.70	76.32	96.88	78.41	76.90	82.81	91.35	105.31	208.67
Cost per bushel	.68	.73	.64	.64	.70	.67	.65	.96	.75

Man and horse labor was the most important item of cost in all areas with the exception of Aroostook County, Me. In the Maine area the fertilizer cost was greater than the combined costs of man and horse labor.

The cost per acre for each item was computed by dividing the total cost for that item on the farms studied by the total number of acres, thus obtaining a weighted average for the region. This method resulted in a relatively low regional cost per acre for items that did not occur on the entire acreage. In the areas of Clay County, Minn., and Aroostook County, Me., for instance, manure was applied on only about one-third of the acreage planted to potatoes, resulting in a low charge for manure per acre when distributed over the total potato acreage. The costs of fertilizer per acre are low for the Barron and Montcalm areas for the reason that only one farmer in each area used fertilizer on his potato land.

A wide range will be noticed in the average costs per acre for the different regions studied. There is, however, a relatively slight range

in the average costs per bushel. The difference in yields tends to reduce the variation in cost per bushel. The high cost per bushel for the Monroe County, N. Y., area is due mainly to the low yield in 1919. The normal yield for this region is about 150 bushels per acre, but in 1919 the average yield obtained was only 110 bushels. With a normal yield the cost per bushel would compare favorably with the other sections studied. Many of the farmers in this region were within driving distance of Rochester, enabling them to realize higher prices for their potatoes than the farmers who had to ship. It is to be expected that the cost of producing potatoes in the important producing centers would not vary greatly when the transportation charges are the same.

VARIATION IN COST PER ACRE.

In Table 9 the farms have been grouped according to the cost per acre. The farms of Aroostook County, Me., are in a class by themselves. The extensive use of fertilizer and the high yields increasing the labor requirements result in high costs per acre. The variations in cost per acre in the other areas are more similar. Slightly more than one-third of the farmers produced the crop at a cost between $80 and $100 per acre, and about one-fourth of the farmers produced the crops at less than $80 an acre.

TABLE 9.—*Variation in costs per acre (461 farms, 1919)—Potatoes.*

Per acre cost groups.	Number of farms.								
	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay County.	Anoka County.	Barron County.	Waupaca County.	Montcalm County.	Grand Traverse County.	Monroe County.	Steuben County.	Aroostook. County.
Less than 60 dollars..	3	1	.....	1	3	3	.....	.....	.....
60 to 69 dollars...	10	1	.....	4	7	2	.....	3	.....
70 to 79 dollars...	14	11	3	7	10	9	.....	5	.....
80 to 89 dollars...	16	18	5	18	10	15	2	12	.....
90 to 99 dollars...	3	10	9	7	11	8	6	7	.....
100 to 109 dollars.	2	10	7	9	5	8	9	10	.....
110 to 119 dollars.	1	2	11	1	1	3	10	6	.....
120 to 129 dollars.	1	.....	7	1	.....	1	10	5	1
130 to 139 dollars.	1	.....	.....	.....	1	3	7	1	.....
140 to 149 dollars.	.....	.....	3	1	.....	.....	4	.....	.....
150 to 159 dollars.	.....	.....	1	.....	1	.....	1	.....	.....
160 to 169 dollars.	.....	1	1	1	.....	.....	.....	1	.....
170 to 179 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	2
180 to 189 dollars.	.....	.....	.....	.....	.....	.....	1	.....	5
190 to 199 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	8
200 to 209 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	8
210 to 219 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	8
220 to 229 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	7
230 to 239 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	7
240 to 249 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	5
250 to 259 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	4
260 to 269 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	1
270 to 279 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	1
280 to 289 dollars.	.....	.....	.....	.....	.....	.....	.....	.....	1
Average yield (bushels).....	103	104	152	123	109	124	141	110	278

VARIATION IN COST PER BUSHEL.

The average cost per bushel for all farms was 78 cents for the year 1919. The number of farmers producing at certain costs and the cumulative percentage of the production at these costs are shown in Figure 6. Eighty-six per cent of the production was obtained at a cost of $1 per bushel or less, and 71 per cent of the growers had costs of $1 or less. The outstanding factor on the farms with extremely low costs per bushel was the yield. The costs per acre were also relatively low on these farms, but the high yields reduced the cost per bushel. Similarly, the farms with excessively high costs per

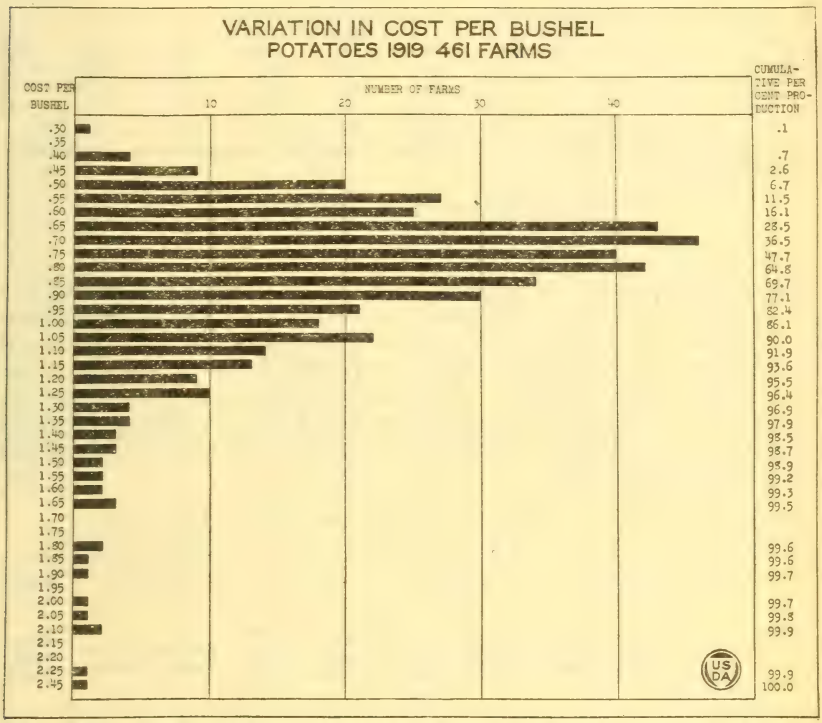

FIG. 6.—The cost per bushel of potatoes grown on 461 farms in 1919 ranged from 30 cents to $2.45, with most of the farms producing at cost of $1 or less per bushel.

bushel had extremely low yields per acre accompanied with relatively high costs per acre. With normal yields these high costs per bushel would have been cut in half.

RELATION OF YIELD TO COST PER BUSHEL.

Yield per acre is an important factor affecting the cost per bushel, as has been previously pointed out. In Table 10 the farms are arranged in groups according to the yields, the table giving the relative yields and relative costs rather than the actual amounts. The yield and costs for each farm were reduced to the percentage that each was of the average for the area to which it belonged in order to place all farms on a comparable basis.

The table shows clearly that although the increased yields within these groups required greater costs per acre in labor and material, as well at greater total costs per acre, the additional bushels produced more than covered the additional costs and resulted in lower costs per bushel.

TABLE 10.—*Relation of yield per acre to costs,*[1] *per cent of average.*

Yield group.	Number farms.	Average yield per acre.	Man labor.	Horse Labor.	Materials.	Total cost.	
						Per acre.	Per bushel.
Less than 70	59	57	86	87	93	89	149
70 to 89	93	80	97	99	91	96	112
90 to 109	161	99	99	100	97	99	94
110 to 129	81	119	106	107	113	108	86
130 and over	67	144	112	104	109	110	72

[1] In preparing this table the items for each farm were expressed as percentages of the averages of the items for the area in which the farm was found.

ANALYSIS OF ITEMS OF COST.

LABOR.

The rates per hour for man and horse labor used in computing the costs in the different areas are shown in Table 11. The rates for man labor are based on wages paid to hired labor plus the value of board consumed in the household. The operator's labor is computed at the same rate as hired labor. The rates for horse labor are based on cost-account records which had been taken in the different States under conditions similar to those prevailing in the sections where the potato studies were made.

TABLE 11.—*Man and horse labor rates per hour, 1919.*

	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay county.	Anoka County.	Barron County.	Waupaca County.	Montcalm County.	Grand Traverse County.	Steuben County.	Monroe County.	Aroostook County.
Man labor	$0.40	$0.35	$0.34	$0.32	$0.32	$0.30	$0.30	$0.32	$0.38
Horse labor	.24	.20	.20	.20	.20	.20	.24	.24	.24

The cost of man labor and horse labor is dependent on two factors, namely, hours spent on the crop and the cost of this labor per hour. The hours of man labor were more nearly constant from year to year than were wages, which have fluctuated greatly during the past few years. Quantities, therefore, will be stressed in the following discussions of labor and of other items of cost. The variations in farm practices in growing potatoes, which affect the hours of labor required, are discussed under the following different operations: Manuring, preparation, planting, spraying, cultivating, harvesting, and marketing. The variations in the practices followed in the nine areas are shown in Tables 12 to 20. They show the usual as well as the unusual practices in each region. The most common crew in

these tables is practically the average crew for the region, though its rate of work is not necessarily exactly the average rate per day, which is based on the average instead of on the most common crew.

TABLE 12.—*Cultural practices on 51 farms in Clay County, Minn.—Potatoes, 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acres.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Man.	Horse.
Manure	41	80	835	33	1-4	18.8 tons	1	10.3	34.4
Plow:									
Horses	47	92	2,098	82	1-5	4.7 acres	1	2.3	11.1
Tractor[1]	7	14	488	19	1	11.4 acres	1	1.1	.....
Harrow:									
Spike	44	86	2,005	78	1-4	38.8 acres	1.7	.5	1.9
Spring	4	8	429	17	1-4	15.5 acres	1.8	1.1	5.5
Disk	21	41	668	26	1-4	13.2 acres	1.4	1.5	6.1
Rolling	1	2	35	1	.....	20 acres	1	.5	2.0
Sprouting seed	7	14	313	12	1	310 bushels	1.4	.8	.....
Treating seed	13	25	779	30	1	168 bushels	1	1.0	.....
Cutting seed	51	100	2,558	100	1	30 bushels	.....	3.9	.....
Plant (planter)	51	100	2,558	100	1-4(26)	6.4 acres	1	1.7	4.9
Cultivating:									
1 row, 2-horse	40	78	1,426	56	1-2(25)	5.8 acres	4.1	7.4	14.8
2-row, 3-horse	2	4	118	5	1-3	10 acres	4.0	4.0	12.0
2 row, 4-horse	10	20	1,099	43	1-4	10.3 acres	4.1	4.4	17.5
Spike tooth	35	69	1,610	63	1-4	38.9 acres	1.6	.4	1.7
Weeder	31	61	1,870	73	1-2	21.2 acres	2.0	1.0	2.0
Hoeing	2	4	46	2	1	4 acres	1	3.3	.....
Spraying	28	55	1,037	41	1-2	27.2 acres	1.7	.8	1.4
Dusting	22	43	1,241	49	1-1	32.5 acres	1.8	.6	.8
Dusting by hand	2	4	30	1	1	8 acres	1.5	1.8	.....
Digging	51	100	2,524	100	1-4	5 acres	1	2.0	8.2
Picking up	51	100	2,524	100	1	1.1 acres	1	11.8	.....
Sorting and grading	27	53	[2] 106,359	41	3	390 acres	1	8.2	.....
Hauling:									
To barn	51	100	[2] 70,344	27	1-2	396 acres	.....	4.3	8.6
To market	51	100	[2] 229,144	88	1-2	279 acres	.....	5.9	12.9

[1] 28 acres plowed in the fall with tractor, and again in the spring with a 1-5 crew. [2] Bushels.

TABLE 13.—*Cultural practices on 54 farms in Anoka County, Minn.—Potatoes, 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acres.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Man.	Horse.
Manure	53	98	754	87	2–4	20.6 tons		13.5	29.4
Green manure	2	4	55	6				2.6	9.9
Apply straw	1	2	20	2		6 tons		5.0	10.0
Plow	52	96	823	95	1–4	3.3 acres	1.1	3.6	11.9
Plow, tractor	2	4	47	5	1	6.5 acres	1.0	1.6	
Harrow:									
Spike	48	89	784	90	1–3	22.3 acres	1.6	.9	2.5
Spring	9	17	126	14	1–3	7.3 acres	1.3	2.1	6.5
Disk	29	54	368.5	42	1–3	6.9 acres	1.4	2.5	7.8
Disk-tractor	2	4	37.5	4	1	12.5 acres	1.0	1.2	
Mark off	20	37	267.5	31	1–2	13.5 acres	1.6	1.3	2.5
Sprouting seed	1	2	10	1		50 bushels		2.0	
Treating seed	13	24	182.5	21	1	96 bushels		1.5	
Cutting seed	54	100	870	100	1	25 bushels		4.0	
Planting:									
Drills	33	61	587.5	68	1–2	5.2 acres	1.0	2.1	4.1
By hand	21	39	282.5	32	1	2.1 acres	1.0	5.2	
Cultivating:									
1 row, 2 horse	51	94	815	94	1–2	5.9 acres	4.6	8.8	17.6
1 row, 1 horse	23	43	343	39	1–1	4.7 acres	2.7	6.2	6.2
2 row, 3 horse	2	4	47	5	1–3	11 acres	5.5	4.9	14.7
Spike tooth	53	98	850	98	1–2	21.2 acres	2.2	1.1	3.0
Weeder	18	33	354	41	1–2	15.1 acres	1.6	1.2	1.7
Hoe	14	26	193	22	1	2.1 acres	1.0	7.6	
Spray	54	100	870	100	1–2	16.6 acres	3.1	2.3	3.4
Digging:									
Machine	52	96	820	95	1–4	3.8 acres		3.7	11.5
Hand	1	2	8	1		.2 acre		40	
Tractor	1	2	35	4		5 acres		2.0	
Pick up	54	100	863	100	1	1.7 acres		15.6	
Sort and grade	12	22	[1] 9,176	10	1	288 bushels		8.0	
Haul to barn	54	100	[1]26,505	29	1–2	448 bushels		3.5	6.0
Haul to market, 3.7 miles	49	91	[1]70,482	78	1–2	158 bushels		8.3	15.8
Haul to market, truck, 6.4 miles	5	9	[1] 6,685	8	1	151 bushels		9.1	

[1] Bushels.

TABLE 14.—*Cultural practices on 47 farms in Barron County, Wis.—Potatoes, 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acres.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Men.	Horse.
Manure	42	89	300	79	2-3	21.7 tons..	1	14.9	24.3
Plow:									
Team	44	94	348	91	1-2	2.4 acres...	1	4.5	11.7
Tractor	3	6	33	9	1	9 acres....	1	1.1	.....
Harrow:									
Spike	43	91	337	88	1-2	16.8 acres..	1.9	1.3	2.9
Spring	12	26	102	27	1-3	9.4 acres...	1.7	2.0	6.0
Disk	41	87	322	85	1-3	5.7 acres...	1.7	3.3	10.9
Float	2	4	19	5	1-2	16 acres...	1	.6	1.3
Marking off	15	32	118	31	1-2	14.2 acres..	1.7	1.3	2.5
Treating seed	7	15	88	23	1	78 bushels.	1	2.8	.....
Cutting seed	47	100	381	100	1	20 bushels.	1	6.3	.....
Planting	32	68	262	69	1-2	4.7 acres...	1	2.5	4.5
Planting by hand	15	32	118	31	1	1.7 acres...	1	6.1	.....
Cultivating:									
1 horse	25	53	200	53	1-1	4.8 acres...	3.7	7.8	7.8
2 horse	39	83	320	84	1-2	5.3 acres...	3.9	7.8	15.7
Spike tooth	44	94	349	92	1-2	16.4 acres..	2.4	1.6	3.8
Hoeing	16	34	92	24	1	1.7 acres...	1.1	11.1	.....
Spraying	20	43	202	53	1-2	12.4 acres..	2.4	2.4	4.4
Spraying by hand	16	34	85	22	1	2.9 acres...	2.5	11.6	.....
Dusting by hand	15	32	104	27	1	4.6 acres...	1.8	5.3	.....
Digging[1]	41	87	342	90	1-4	3.1 acres...	1	4.4	15.6
Digging by hand	4	9	15	4	1	.2 acre....	1	39.0	.....
Picking up	47	100	380	100	4	2.1 acres...	1	27.3	.....
Hauling to barn	47	100	[2] 15,798	27	1-2	281 bushels	1	8	13.6
Hauling to market	47	100	[2] 48,536	84	1-2	116 bushels	1	14.7	29.5

[1] Potatoes on one farm were dug by contract and on another with a digger drawn by tractor.
[2] Bushels.

TABLE 15.—*Cultural practices on 50 farms in Waupaca County, Wis.—Potatoes, 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acre.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Men.	Horse.
Manure	49	98	534	87	1–2	16.9 tons	1	10.8	18.6
Plow	48	96	590	96	1–2	1.9 acres	1	5.3	11.8
Plow, tractor	2	4	24	4	1	7 acres	1	1.4	.....
Harrow:									
Spike	41	82	516	84	1–2	14.9 acres	1.6	1.2	2.5
Spike and disk tractor	1	2	4	1	1	8 acres	1	1.2	.....
Spring	23	46	261	43	1–3	7.6 acres	1.3	1.8	4.5
Spring tractor	1	2	20	3	1	20 acres	2.	1.0	.....
Disk	23	46	274	45	1–3	5.5 acres	1.	2.1	6.1
Rolling	1	2	9	1	1–2	15 acres	1.	.6	1.2
Floating	2	4	34	6	1–2	20 acres	1.	.5	1.0
Marking off	38	76	455	74	1–2	14.4 acres	1.5	1.1	1.7
Sprouting seed	2	4	38	6	1	30 bushels	1	4.5	.....
Cutting seed	50	100	614	100	1	20 bushels	1	5.4	.....
Planting	15	30	184	30	1–2	4.2 acres	1	2.6	4.8
Planting, hand	36	72	430	70	1	1.6 acres	1	6.5	.....
Cultivating:									
1 row, 1 horse	40	80	436	71	1–1	4.5 acres	5.1	11.6	11.6
1 row, 2 horse	15	30	243	40	1–2	6.6 acres	4.6	8.1	16.2
Spike tooth	43	86	551	90	1–2	15.4 acres	2.2	1.5	3.1
Spike tooth, tractor	1	2	20	3	1	30 acres	1	.4	.....
Spring tooth	9	18	97	16	1–2	9 acres	1.1	1.2	2.4
Weeder	4	8	46	7	1–1	8.9 acres	1.5	1.5	1.5
Hoeing	18	36	209	34	1	2.3 acres	1.1	6.9	.....
Spraying	5	10	68	11	1–1	19.2 acres	2.6	1.2	1.6
Spraying by hand	19	38	190	31	1	5.3 acres	1.8	5.1	.....
Dusting	1	2	25	4	1–1	20 acres	3	1.5	1.5
Dusting by hand	20	40	232	38	1	9.6 acres	2.1	3.5	.....
Digging	35	70	481	78	1–2	2.4 acres	1	4.9	14.1
Digging by hand	16	32	133	22	1	0.6 acre	1	20.5	.....
Picking up	50	100	614	100	1	1.1 acres	1	17.8	.....
Sorting and grading	6	12	[1] 5,370	7	1	243 bushels	1	8.8	.....
Hauling to barn	49	98	[1] 36,163	48	1–2	393 bushels	1	5.1	9.5
Hauling to market	50	100	[1] 66,019	88	1–2	159 bushels	1	9.1	18.5

[1] Bushels.

TABLE 16.—*Cultural practices on 52 farms in Grand Traverse County, Mich.—Potatoes, 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acre.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Man.	Horse.
Manure	49	94	402	81	1-2	20.2 tons	1	10	16.3
Plow	52	100	497.5	100	1-2	1.7 acres	1	6	13.2
Harrow:									
Spike	3	6	19.5	4	1-2	11.7 acres	1.3	1.3	2.5
Spring	51	98	493	99	1-2	9.2 acres	2.8	3.2	7.5
Disk	33	63	321.5	65	1-3	6.3 acres	2	3.2	9.3
Rolling	19	37	176	35	1-2	11.3 acres	1.1	1	2.1
Floating	2	4	15	3	.....	13 acres	1	1	2.2
Marking off	32	62	294.5	59	1-1	12.1 acres	1.4	1.2	1.3
Marking by hand	17	33	171	34	2	11.3 acres	1.2	2.3	.....
Stone picking	1	2	8	2	.....	2 acres	1	5	10
Cutting seed	52	100	492.5	99	1	25 bushels	1	5.1	.....
Planting	4	8	45	9	1-2	5 acres	1	2.6	4
Planting by hand	48	92	452.5	91	1	1.5 acres	1	7.1	.....
Hauling seed	2	4	23	5	1-2	23 acres	1	.4	.8
Cultivating:									
1 row, 1 horse	41	79	396	80	1-1	4.4 acres	4.3	10.7	10.7
1 row, 2 horses	21	40	232.5	47	1-2	5.3 acres	4	7.6	15.2
Spike tooth	25	48	247.5	50	1-2	12.9 acres	1.9	1.9	3.4
Spring tooth	24	46	231	46	1-2	9.8 acres	2.2	2.5	5.6
Rolling after planting	1	2	9	2	1-2	12 acres	1	.9	1.8
Hoeing	17	33	174.5	35	1	4.5 acres	1	3.8	.....
Spraying	8	15	108.5	22	1-2	14 acres	3.1	2.2	4.2
Spraying by hand	40	77	362	73	1	3.7 acres	2.5	9.5	.....
Dusting	1	2	11.5	2	1-2	11.5 acres	1	1	2
Dusting by hand	2	4	11	2	1	3 acres	2.5	10	.....
Digging	11	21	121	25	1-2	2 acres	1	5.7	13.6
Digging by hand	42	81	372.5	75	1	0.5 acre	1	27.9	.....
Picking up	50	96	471.5	96	1	1.1 acres	.....	14.7	.....
Picking up, stone boat	2	4	22	4	1-1	1 acre	.....	10.2	10.2
Hauling to barn	51	98	[1]29,442	48	1-2	396 bushels	.....	4.3	8.2
Hauling to market	52	100	[1]52,853.5	86	1-2	159 bushels	.....	9.6	18.9

[1] Bushels.

TABLE 17.—*Cultural practices on 49 farms in Montcalm County, Mich.—Potatoes. 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acre.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Man.	Horse.
Manure	48	98	472	93	2-3	20.8 tons	1	10.6	19.3
Plow	42	86	438	86	1-3	2 acres	1	5.4	13.4
Plow, tractor	7	14	70	14	1	6 acres	1	1.7	.....
Harrow:									
Spike	6	12	61.5	12	1-2	15.9 acres	1.3	1	3.3
Spike, tractor	3	6	36	7	1	23.7 acres	2.7	.9	.....
Spring	43	88	448.5	88	1-3	11.4 acres	2.8	2.8	7
Disk	8	16	60	12	1-3	7.6 acres	1.6	2.5	7.8
Disk, tractor[1]	3	6	30	6	1	16 acres	1.7	.6	.....
Rolling	23	47	233.5	46	1-2	13.5 acres	1	.8	1.6
Floating	1	2	11	2	.....	9 acres	1	1.2	3.6
Marking off	42	86	447	88	1-1	16.7 acres	1.6	1	1
Sprouting seed	1	2	10	2	.....	600 bushels	2	.4	.....
Treating seed	7	14	73	14	1	125 bushels	1	.7	.....
Cutting seed	48	98	498	98	1	21 bushels	1	4.2	.....
Planting seed	7	14	61	12	1-2	5.1 acres	1	3	4.9
Planting by hand	42	86	447	88	1	2.2 acres	1	5.1	.....
Cultivating:									
1 row, 1 horse	42	86	426	84	1-1	5.3 acres	4.5	8.5	8.5
1 row, 2 horses	28	57	309.5	61	1-2	5.3 acres	3.8	7.2	14.3
Spike tooth	31	63	337.5	66	1-2	16.4 acres	1.6	1	2.3
Spring tooth	7	14	66	13	1-3	8.5 acres	1.6	1.8	4.7
Spring tooth, tractor	1	2	9	2	.....	18 acres	2	1.1	.....
Rolling after planting	1	2	16	3	1-2	16 acres	1	.6	1.2
Hoe	14	29	165	32	1	2.9 acres	1	3.7	.....
Spray	33	67	365	72	1-2	14.2 acres	2.8	2.4	3.9
Spray by hand	6	12	41	8	1	3.8 acres	2.3	6.5	.....
Dust by hand	1	2	7	1	1	7 acres	1	2.1	.....
Pick worms	1	2	9	2	1	3 acres	7	23.3	.....
Dig	46	94	474	93	1-2	2.3 acres	1	6.3	15.3
Dig by hand	4	8	34	7	1	1 acre	1	17.6	.....
Picking up	49	100	508	100	2	1.3 acres	1	17.7	.....
Sort and grade	4	8	[2] 3,900	7	1	234 bushels	1	8.5	.....
Haul to barn	49	100	[2] 26,231	48	1-2	286 bushels	1	7.1	11.8
Haul to market	47	96	[2] 43,842	79	1-2	159 bushels	1	8.9	16.8
Haul to truck	1	2	[2] 1,135	2	.....	270 bushels	1	4.3	.....

[1] Normal time on one record—two on contract.

[2] Bushels.

TABLE 18.—*Cultural practices on 50 farms in Steuben County, N. Y.—Potatoes, 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acre.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Man.	Horse.
Manure	49	98	418	75	1–2	12.5 tons	1	12.6	24
Applying straw	2	4	29	5	.....	9.5 tons	.....	4	5.8
Hauling fertilizer	8	16	78.5	14	1–2	13.2 acres	.....	1.1	2.3
Applying fertilizer	10	20	118.5	21	1–2	7.2 acres	.....	1.5	2.5
Plowing	49	98	546.5	98	1–3	1.7 acres	1	5.8	15.2
Plowing (tractor)	1	2	14	2	.....	.....	.....	(1)	(1)
Harrowing (spring tooth)	47	94	515.5	92	1–3	9.9 acres	2.7	2.7	7.8
Harrowing (spike tooth)	5	10	69	12	1–2	11.2 acres	1.8	1.5	4.1
Rolling	5	10	52	9	1–2	15.4 acres	1	.6	1.3
Floating	1	2	17	3	1–2	15 acres	1	.6	1.2
Marking off	38	76	364	65	1–2	10.5 acres	1.2	1.1	1.8
Sprouting seed	1	2	12	2	.....	60 bushels	1	2.5	.....
Treating seed	7	14	101	18	1	98 bushels	1	1.6	.....
Cutting seed	50	100	560.5	100	1	22 bushels	.....	5	.....
Planting	19	38	261	47	1–2	3.6 acres	1	3.9	5.8
Planting (by hand)	32	64	299.5	53	1	2.7 acres	1	5.2	.....
Cultivating:									
1 row, 1-horse	35	70	377	67	1–1	4.3 acres	4.6	10.4	10.4
1 row, 2-horse	49	98	554.5	99	1–2	5.2 acres	3.4	6.7	13.4
Spike tooth	9	18	111	20	1–2	12.1 acres	1.3	1.1	2
Planker	15	30	143	26	1–2	15.9 acres	1	.7	1.4
Weeder	23	46	282	50	1–1	12.5 acres	1.7	1.4	1.6
Spraying	15	30	215	38	1–2	12.2 acres	2.5	2.2	4.1
Spraying by hand	17	34	171.5	31	1	4.6 acres	1.6	4.1	.....
Dusting by hand	6	12	56	10	1	7 acres	2	3.8	.....
Bugging	1	2	4.5	1	1	1.5 acres	1	5.3	.....
Digging	39	78	435.5	78	1–2	2.0 acres	.....	7	13.3
Digging by hand	13	26	125	22	1	0.7 acre	.....	19.5	.....
Picking up	50	100	560.5	100	2	1.2 acres	.....	21.9	.....
Sorting and grading	8	16	[2] 7,045	9	1	196 bushels	.....	10.5	.....
Hauling to barn	50	100	[2] 79,046	100	1–2	410 bushels	.....	6.3	9.5
Hauling to market	50	100	[2] 66,105	84	1–2	112 bushels	.....	13.6	26.8

[1] Contract.

[2] Bushels.

TABLE 19.—*Cultural practices on 50 farms in Monroe County, N. Y.—Potatoes, 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acre.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Man.	Horse.
Manure	49	98	487	90	2-3	19.1 tons	.....	14.6	23.9
Haul fertilizer	12	24	96	18	1-2	14.8 acres	.....	.9	1.7
Haul fertilizer (truck)	1	2	6	1	1	36 acres	.....	.3	.....
Apply fertilizer	18	36	158.5	29	1-2	9.9 acres	.....	1	2.1
Plow	49	98	523.5	97	1-3	1.6 acres	1	6.7	19.9
Plow, tractor	1	2	16	3	.....	3 acres	1	3.3	.....
Harrow:									
Disk	11	22	116.5	22	1-3	7.7 acres	1.8	2.5	7.9
Spring	48	96	515.5	96	1-3	10.1 acres	2.8	3.0	9.1
Spring, tractor	2	4	24	4	.....	16 acres	2	1.9	.....
Spike	2	4	14	3	.....	13.5 acres	1	.8	2
Roll	43	86	460	85	1-2	12.3 acres	1.1	1	2.3
Mark	1	2	7	1	1-2	7 acres	1	1.1	2.2
Treat seed	5	10	70.5	13	1	106 bushels	.....	1.5	.....
Cut seed	50	100	539.5	100	1	18 bushels	.....	7.4	.....
Plant	49	98	532.5	99	1-2	3.8 acres	1	3.8	5.6
Plant by hand	1	2	7	1	1	3 acres	1	3.3	.....
Cultivate:									
1 row, 1-horse	25	50	260	48	1-1	4.2 acres	2.8	7	7
1 row, 2-horse	43	86	484	90	1-2	4.6 acres	4.9	11.4	22.9
Plank	2	4	20	4	.....	14 acres	1	.7	1.8
Float	1	2	8	1	.....	8 acres	1	1.2	2.4
Roll	14	28	136	25	1-2	11.8 acres	1	.8	1.8
Cultivate, spike tooth	7	14	81	15	1-2	16.1 acres	1.7	1.1	2.5
Cultivate, spring tooth	1	2	7	1	1-2	8 acres	1	1.3	2.6
Weed	36	72	413.5	77	1-2	14.3 acres	1.6	1.2	1.9
Hoe	23	46	238.5	44	1	3.1 acres	1	6.9	.....
Spray	19	38	232.5	43	1-2	13.8 acres	2.4	2.2	4.1
Spray by hand	9	18	65	12	1	3 acres	1.7	8.6	.....
Dust	1	2	10	2	1	10 acres	1	.8	1.6
Dust by hand	1	2	4	1	1-2	1.3 acres	1	7.5	.....
Dig	50	100	539.5	100	1-4	1.9 acres	.....	6.8	22.2
Pick up	50	100	539.5	100	1	0.6 acre	.....	20.1	.....
Sort and grade	16	32	[1] 12,104	20	2	360 bushels	.....	9.2	.....
Haul to barn	50	100	[1] 59,245	100	1-2	399 bushels	.....	4.6	7.5
Haul to market	50	100	[1] 46,930	79	1-2	200 bushels	.....	10.7	19.8

[1] Bushels.

TABLE 20.—*Cultural practices on 58 farms, Aroostook County, Me.—Potatoes, 1919.*

Operation.	Farms.		Acres.		Most common crew.	Rate per day (once over).	Times over.	Hours per acres.	
	Number.	Percentage of total.	Covered.	Percentage of total.				Man.	Horse.
Picking stones	14	24	459	28	2–2	10 acres		3.9	4.9
Manure	53	91	606	37	2–2	12.8 tons		14.1	18.0
Hauling fertilizer	57	98	1,621	99	1–2	7.8 acres		2.1	4.0
Applying fertilizer	57	98	1,621	99				(1)	(1)
Plowing	54	93	1,478	91	1–2	1.5 acres	1.0	7.1	14.3
Plowing (tractor)	4	7	155	9	1	5.2 acres		2.0	
Harrowing:									
Spring	51	88	1,183	72	1–2	8.8 acres	1.9	2.3	4.7
Spring, tractor	7	12	450	28	1	19 acres	2.5	1.4	
Disk	32	55	596	36	1–2	7.6 acres	2.3	3.1	7.5
Disk, tractor	5	9	117	7	1	15 acres	1.3	.8	
Rolling	5	9	90	6	1–2	17.8 acres	1.0	.6	1.2
Cutting seed	58	100	1,633	100	1	8.5 bbls		6.6	
Planting	58	100	1,633	100	2–2	3.7 acres	1.0	4.3	5.5
Cultivating:									
1 man, 2 horses	58	100	1,633	100	1–2	6.4 acres	7.8	13.3	26.6
1 man, 1 horse	10	17	287	18	1–1	4.6 acres	1.0	2.2	2.2
Spike tooth	1	2	15	1		5 acres	1.0	2.0	2.0
Hoeing	41	71	1,015	62	1	2.3 acres	1.2	11.1	
Spraying	58	100	1,633	100	1–2	11.9 acres	4.5	4.2	7.7
Digging	58	100	1,633	100	1–2	2 acres		6.6	13.5
Picking up	58	100	1,633	100	3	1.3 acres		23.0	
Hauling to barn	57	98	[2] 92,676	56	1–2	240 bbls		5.7	11.3
Hauling to barn, tractor	1	2	[2] 1,800	1				(3)	(3)
Sorting and grading	36	62	[2] 54,390	33	2	98 barrels		21.7	
Hauling to market	57	98	[2] 142,469	86	1–2	96 bbls		14.9	28.3
Hauling to market, truck	1	2	[2] 3,600	2		240 bbls		2.3	

[1] Included in planting. [2] Barrels. [3] Contract.

The differences in practices on individual farms affect the hours of labor used in raising the crop. Tables 21 to 34 show the range in hours per acre for the different operations, indicating the number of growers who fall above and below the average hours per acre devoted to the different operations in the areas.

TABLE 21.—*Range in man hours per acre—Potatoes, 1919 (manuring).*

County.	2 hours or less.		3 to 4 hours.		5 to 6 hours.		7 hours and over.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	29	70.7	8	19.5	2	4.9	2	4.9	1.8
Anoka	9	17.0	13	24.5	14	26.4	17	32.1	6.0
Barron	6	14.3	12	28.6	6	14.3	18	42.8	5.8
Waupaca	7	14.3	23	46.9	11	22.5	8	16.3	4.5
Montcalm	13	27.1	12	25.0	15	31.2	8	16.7	5.1
Grand Traverse	15	29.4	20	39.2	10	19.6	6	11.8	4.1
Steuben	6	12.2	16	32.7	18	36.7	9	18.4	4.5
Monroe	5	10.2	5	10.2	22	44.9	17	34.7	6.3
Aroostook	31	58.5	12	22.6	4	7.6	6	11.3	2.5

TABLE 22.—*Range in man hours per acre—Potatoes, 1919 (preparation).*

County.	4 hours or less.		5 to 8 hours.		9 to 12 hours.		13 hours and over.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	41	93.2	1	2.3	2	4.5	.....	.....	3.4
Anoka	22	42.3	20	38.5	8	15.4	2	3.8	5.5
Barron	1	2.3	20	46.5	17	39.6	5	11.6	10.5
Waupaca	2	4.1	32	66.7	13	27.1	1	2.1	7.6
Montcalm	1	2.4	22	53.7	14	34.1	4	9.8	8.5
Grand Traverse	.....	.....	9	16.7	32	59.2	13	24.1	11.4
Steuben	2	4.1	30	61.2	16	32.7	1	2.0	8.5
Monroe	.....	.....	11	23.9	23	50.0	12	26.1	11.1
Aroostook	.....	.....	8	16.7	24	50.0	16	33.3	11.8

TABLE 23.—*Range in man hours per acre—Potatoes, 1919 (planting).*

County.	1 to 6 hours.		7 to 9 hours.		10 to 12 hours.		13 hours and over.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	37	84.1	7	15.9	.....	.....	.....	.....	5.6
Anoka	25	46.3	16	29.6	9	16.7	4	7.4	7.8
Barron	6	12.8	18	38.3	9	19.1	14	29.8	11.2
Waupaca	2	4.0	14	28.0	22	44.0	12	24.0	11.5
Montcalm	7	14.3	19	38.8	18	36.7	5	10.2	10 0
Grand Traverse	3	5.7	2	3.8	19	35.8	29	54.7	12.8
Steuben	6	12.0	13	26.0	17	34.0	14	28.0	10.6
Monroe	1	2.0	14	28.6	20	40.8	14	28.6	11.6
Aroostook	.....	.....	4	9.3	19	44.2	20	46.5	12.5

TABLE 24.—*Range in man hours per acre—Potatoes, 1919 (spraying).*

County.	1 hour and less.		2 to 3 hours.		4 to 5 hours.		6 hours and over.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	48	94.1	3	5.9	.....	.....	.....	.....	0.6
Anoka	24	44.4	27	50.0	1	1.9	2	3.7	2.0
Barron	9	19.6	15	32.6	4	8.7	18	39.1	5.4
Waupaca	13	31.0	16	38.1	3	7.1	10	23.8	2.8
Montcalm	15	36.6	13	31.7	8	19.5	5	12.2	2.8
Grand Traverse	4	7.8	6	11.8	9	17.7	32	62.7	7.1
Steuben	16	41.0	11	28.2	9	23.1	3	7.7	2.7
Monroe	7	25.9	10	37.1	5	18.5	5	18.5	2.0
Aroostook	1	1.7	29	50.0	19	32.8	9	15.5	4.0

TABLE 25.—*Range in man hours per acre—Potatoes, 1919 (cultivating).*

County.	1 to 8 hours.		9 to 12 hours.		13 to 16 hours.		17 hours and over.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	38	74.5	11	21.6	2	3.9			6.9
Anoka	8	14.8	18	33.4	12	22.2	16	29.6	13.6
Barron	10	21.3	10	21.3	14	29.8	13	27.6	14.7
Waupaca	6	12.2	13	26.5	13	26.6	17	34.7	15.3
Montcalm	4	8.2	21	42.9	16	32.6	8	16.3	13.7
Grand Traverse	5	9.6	14	26.9	18	34.6	15	28.9	14.5
Steuben	5	10.0	14	28.0	16	32.0	15	30.0	14.5
Monroe	1	2.0	10	20.0	14	28.0	25	50.0	16.9
Aroostook	6	10.3	7	12.1	9	15.5	36	62.1	19.6

TABLE 26.—*Range in man hours per acre—Potatoes, 1919 (harvesting).*

County.	1 to 20 hours.		21 to 30 hours.		31 to 40 hours.		41 hours and over.		Average hours.
	Number.	Percentage	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay									[1] 3.0
Anoka	17	44.7	14	36.9	3	7.9	4	10.5	21.0
Barron	7	15.9	20	45.5	6	13.6	11	25.0	34.1
Waupaca	10	23.8	12	28.6	12	28.6	8	19.0	27.4
Montcalm	10	31.2	11	34.4	6	18.8	5	15.6	26.4
Grand Traverse	5	12.8	12	30.8	12	30.8	10	25.6	32.7
Steuben	2	5.0	13	32.5	14	35.0	11	27.5	34.9
Monroe	14	31.1	13	28.9	13	28.9	5	11.1	28.1
Aroostook									[1] 8.2

[1] Picking not included, this work being done on contract.

TABLE 27.—*Range in man hours per acre—Potatoes, 1919 (marketing).*

County.	1 to 6 hours.		7 to 12 hours.		13 to 18 hours.		19 hours and over.		Average hours
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	24	48.0	23	46.0	3	6.0			7.9
Anoka	23	48.9	15	31.9	5	10.7	4	8.5	7.8
Barron	9	19.6	17	37.0	14	30.4	6	13.0	11.0
Waupaca	21	42.0	23	46.0	4	8.0	2	4.0	8.3
Montcalm	26	55.3	15	31.9	5	10.7	1	2.1	7.4
Grand Traverse	27	52.9	18	35.3	5	9.8	1	2.0	7.6
Steuben	11	22.9	19	39.6	11	22.9	7	14.6	11.4
Monroe	17	46.0	9	24.3	9	24.3	2	5.4	9.6
Aroostook	1	1.9	10	18.9	12	22.6	30	56.6	19.0

TABLE 28.—*Range in horse hours per acre—Potatoes, 1919 (manuring).*

County.	1 to 4 hours.		5 to 7 hours.		8 to 10 hours.		Over 10 hours.		Average hours all farms.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	11	26.8	12	29.3	9	22.0	9	21.9	5.9
Anoka	5	9.4	4	7.5	18	34.0	26	49.1	10.8
Barron	5	11.9	10	23.8	9	21.4	18	42.9	9.4
Waupaca	11	22.5	11	22.4	14	28.6	13	26.5	7.8
Montcalm	10	20.8	14	29.2	11	22.9	13	27.1	9.2
Grand Traverse	18	35.3	15	29.4	8	15.7	10	19.6	6.6
Steuben	5	10.2	12	24.5	15	30.6	17	34.7	8.3
Monroe	3	6.1	11	22.5	13	26.5	22	44.9	10.5
Aroostook	35	66.0	9	17.0	8	15.1	1	1.9	3.3

TABLE 29.—*Range in horse hours per acre—Potatoes, 1919 (preparation).*

County.	1 to 15 hours.		16 to 20 hours.		21 to 25 hours.		Over 25 hours.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	32	72.7	6	13.6	4	9.1	2	4.6	16.7
Anoka	23	44.2	8	15.4	11	21.2	10	19.2	21.7
Barron	4	9.3	11	25.6	8	18.6	20	46.5	26.4
Waupaca	15	31.3	19	39.6	11	22.9	3	6.2	18.3
Montcalm	7	17.0	12	29.3	12	29.3	10	24.4	22.9
Grand Traverse	3	5.6	12	22.2	13	24.1	26	48.1	26.9
Steuben	6	12.2	9	18.4	18	36.7	16	32.7	22.5
Monroe			2	4.3	5	10.9	39	84.8	33.2
Aroostook	5	10.4	12	25.0	9	18.8	22	45.8	24.4

TABLE 30.—*Range in horse hours per acre—Potatoes, 1919 (planting).*

County.	1 hour and less.		2 to 3 hours.		4 to 5 hours.		Over 5 hours.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay			8	18.2	25	56.8	11	25.0	4.7
Anoka	4	7.5	23	43.4	25	47.2	1	1.9	3.0
Barron	4	8.5	17	36.2	18	38.3	8	17.0	3.8
Waupoca	22	44.0	14	28.0	8	16.0	6	12.0	2.6
Montcalm	37	77.1	5	10.4	4	8.3	2	4.2	1.5
Grand Traverse	26	70.3	8	21.6	3	8.1			1.1
Steuben	12	24.0	14	28.0	9	18.0	15	30.0	4.3
Monroe			2	4.1	19	38.8	28	57.1	6.0
Aroostook					3	7.0	40	93.0	8.7

TABLE 31.—*Range in horse hours per acre—Potatoes, 1919 (spraying).*

County.	1 to 2 hours.		3 to 4 hours.		5 to 6 hours.		Over 6 hours.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	47	95.9	2	4.1					0.9
Anoka	26	48.1	16	29.6	9	16.7	3	5.6	3.4
Barron	8	38.1	5	23.8	3	14.3	5	23.8	2.0
Waupaca	6	100.0							0.2
Montcalm	12	36.4	10	30.3	3	9.1	8	24.2	3.0
Grand Traverse	4	44.5	2	22.2	2	22.2	1	11.1	1.1
Steuben	5	33.3	7	46.7			3	20.0	1.6
Monroe	7	36.8	4	21.1	5	26.3	3	15.8	1.8
Aroostook	1	1.7	2	3.5	20	34.5	35	60.3	7.5

TABLE 32.—*Range in horse hours per acre—Potatoes, 1919 (cultivating).*

County.	1 to 15 hours.		16 to 20 hours.		21 to 25 hours.		Over 25 hours.		Average hours.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Clay	20	39.2	21	41.2	7	13.7	3	5.9	17.9
Anoka	5	9.2	19	35.2	15	27.8	15	27.8	24.5
Barron	17	36.2	10	21.3	11	23.4	9	19.1	19.9
Waupaca	19	38.8	19	38.7	4	8.2	7	14.3	17.4
Montcalm	21	42.8	14	28.6	9	18.4	5	10.2	18.2
Grand Traverse	19	38.5	17	32.7	10	19.2	6	11.6	18.7
Steuben	13	26.0	14	28.0	7	14.0	16	32.0	21.7
Monroe	7	14.0	9	18.0	11	22.0	23	46.0	25.0
Aroostook	7	12.0	8	13.8	15	25.9	28	48.3	27.2

TABLE 33.—*Range in horse hours per acre—Potatoes, 1919 (harvesting).*

County.	1 to 10 hours.		11 to 15 hours.		16 to 20 hours.		Over 20 hours.		Average hours.
	Number.	Per centage.	Number.	Per centage.	Number.	Per centage.	Number.	Per centage.	
Clay	33	64.7	15	29.4	3	5.9	.....	.....	10.1
Anoka	10	30.3	12	36.4	7	21.2	4	12.1	13.3
Barron	10	23.8	8	19.0	12	28.6	12	28.6	16.8
Waupaca	15	39.5	8	21.1	8	21.0	7	18.4	15.3
Montcalm	8	25.8	4	12.9	4	12.9	15	48.4	17.8
Grand Traverse	29	74.3	3	7.7	1	2.6	6	15.4	8.6
Steuben	11	27.5	9	22.5	7	17.5	13	32.5	19.2
Monroe	2	4.5	5	11.1	9	20.0	29	64.4	24.2
Aroostook	11	19.3	10	17.6	17	29.8	19	33.3	16.5

TABLE 34.—*Range in horse hours per acre—Potatoes, 1919 (marketing).*

County.	1 to 8 hours.		9 to 16 hours.		17 to 24 hours.		Over 24 hours.		Average hours.
	Number.	Per centage.	Number.	Per centage.	Number.	Per centage.	Number.	Per centage.	
Clay	22	44.0	26	52.0	1	2.0	1	2.0	9.5
Anoka	19	41.3	11	23.9	10	21.7	6	13.1	13.3
Barron	2	4.3	11	23.9	13	28.3	20	43.5	22.0
Waupaca	10	20 0	21	42.0	13	26.0	6	12.0	15.6
Montcalm	9	19.1	24	51.1	11	23.4	3	6.4	12.9
Grand Traverse	9	17.7	28	54.9	7	13.7	7	13.7	15.0
Steuben	3	6.3	12	25.0	16	33.3	17	35.4	20.8
Monroe	13	35.2	8	21.6	8	21.6	8	21.6	15.3
Aroostook	3	5.6	10	18.9	17	32.1	23	43.4	22.4

Manuring.—Manure usually was hauled from the barn to the field in manure spreaders, either during the winter as available or in the spring from the winter's accumulation. Occasionally a grower hauled the manure out during the winter with a wagon or sled and formed large piles, which were spread in the spring with a spreader. In the area of Clay County, Minn., only 33 per cent of the acres planted to potatoes were manured and in the area of Aroostook County Me., only 37 per cent. In all the other areas more than 75 per cent of the acres were manured. Nearly all the manure applied was produced on the farm.

Preparation.—Preparation included the operations of plowing, harrowing, rolling, and floating, or, in other words, getting the land in condition for planting. Plowing was the most important individual operation in preparing the land; 63 per cent of the man labor and 57 per cent of the horse labor in preparation were required for plowing. The average depth of plowing was 6.6 inches, varying from 4 to 10 inches. In the Minnesota and Wisconsin areas nearly half the harrowing was done with the disk, the remainder being done with the spike and spring-tooth harrow. In the Michigan, New York, and Maine areas about three-fourths was done with the spring-tooth harrow and the rest with the disk harrow. The spike-tooth harrow was used very little in preparation in these States.

Planting.—Planting included the operations of cutting, sprouting, and treating seed, marking of rows, applying fertilizer, and planting. The cutting of seed was done by hand. Fertilizer is usually applied at time of planting with potato planter. Not much seed was treated for skin disease. In hand planting the rows are marked off both ways with a horse marker and the pototoes are planted at the intersections of the marks with a hand planter. Hand planting was a common practice in a number of the areas.

In order to point out the differences in labor used, and results obtained between hand planting and machine planting, Table 35 is shown. In hand planting the spacing in the rows is usually wide enough to permit cultivating both ways. Thus less seed is used in hand planting than in machine planting. It is significant that the yield of potatoes is less and the cost of production greater on farms where planting is done by hand than on those planting with machine. This difference in yield and cost is probably due mainly to the difference in quantity of seed used (spacing is a factor in this), increased seeding usually resulting in increased yields, other things being equal.

TABLE 35.—*Hand planting vs. machine planting as affecting rate of planting, time required, yield and cost in growing potatoes (252 farms, 1919).*

Area.	Method of planting.	Number of farms	Acres potatoes per farm.	Distance between rows.	Spacing in rows.	Hours planting.		Bushels seed per acre.	Average yield per acre.	Average cost per acre.	Average cost per bushel.
						Man.	Horse.				
				In.	*In.*				*Bush.*		
Anoka County, Minn.	Hand	21	13.5	37	35	10.3	2.2	8	90	$91	$1.01
	Machine	33	17.8	38	16	6.5	4.0	10	110	86	.78
Barron County, Wis.	Hand	15	7.9	35	32	12.6	2.4	8	138	106	.77
	Machine	32	8.2	36	16	10.5	4.4	13	158	108	.68
Waupaca County, Wis.	Hand	36	11.9	34	34	12.3	1.6	10	119	87	.74
	Machine	15	12.3	33	18	9.7	5.1	12	133	90	.67
Montcalm County, Mich.	Hand	42	10.6	35	35	10.1	1.0	7	107	83	.78
	Machine	7	8.7	35	20	8.7	4.5	10	118	92	.78
Steuben County, N. Y.	Hand	32	9.4	34	29	11.3	5.6	10	134	92	.69
	Machine	19	13.7	35	21	9.7	2.7	12	149	101	.68

Cultivation.—Great variations exist in the methods of cultivation in the different areas studied. The first operation following hand planting is usually "recovering," or cultivating a ridge over the row, which is later harrowed level. This ridge covers seed which may not have been properly covered when planted and assists in controlling young weeds in the row. The size of crew varied from

one-row one-horse to two-row four-horse cultivators. The size of the outfit materially affects the man hours required per acre. The spike-tooth harrow and weeder are used to kill the young sprouts of weed seeds before and just as the potato plants appear above the ground. Considerable hoeing was done in a few of the areas.

Spraying.—Insecticides and fungicides were applied in the form of spray or dust. In the areas of Clay County, Minn., and Barron and Waupaca, Wis., considerable dusting was done. Spraying was the most common form of application in the other areas. For all areas about one-third of the spraying and half of the dusting were done by hand. In the areas of Waupaca, Wis., and Grand Traverse, Mich., most of the spraying and dusting was done by hand. In the area of Steuben County, N. Y., over half was done by hand. Of the 461 farmers visited, 410 sprayed or dusted their potato fields. The least spraying and dusting was done in the area of Steuben and Monroe Counties, N. Y. Only 38 out of 50 farmers in the former district and only 30 out of 50 in the latter district did such work.

Harvesting.—The harvesting of the crop required more man labor than any other operation connected with the growing of potatoes. Harvesting includes the digging, picking, and hauling to the barn. High yields increase the labor per acre, but reduce the labor per bushel over that required when yields are low. Hand digging is a common practice in Grand Traverse County, Mich., and Waupaca County, Wis. The difference in man labor per acre involved in hand digging and machine digging is strikingly shown in the labor practice tables. Potato picking by contract is the most usual practice in the areas of Clay County, Minn., and Aroostook County, Me. The average rate paid for picking in 1919 was 8½ cents a bushel in the former area and 4¾ cents a bushel in the latter area.[4]

After picking, the potatoes were hauled directly to the shipping station, to storage place, which was usually the barn or the house, or were pitted temporarily in the field. The pitting and hauling to storage were considered a part of harvesting. Pitting was most common in the Wisconsin and Michigan areas.

Marketing.—About 11 per cent of the man labor and 18 per cent of the horse labor in producing potatoes are devoted to marketing. This includes the work of sorting and grading and hauling to market. Part of the crop is hauled directly from the field to market and part from storage to market. Table 36 shows how the crop is disposed of in the areas studied. A few of the growers in the areas of Anoka County, Minn., and Monroe County, N. Y., hauled their crops directly to the city market, but most of the potatoes were hauled to the shipping station and sold on the cars.

[4] In the Maine area the unit of potato measure is the barrel.

TABLE 36.—*Disposition of potato crop (461 farms), 1919.*

County.	State.	Total crop, bushel per farm.	Sold—		Saved for seed.	Family use.	Waste, fed, etc.
			In fall.	From storage.			
			Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Clay	Minnesota	5,104	58.3	27.6	9.4	1.1	3.6
Anoka	do	1,667	69.4	16.7	10.0	2.6	1.3
Barron	Wisconsin	1,230	59.5	24.6	8.7	3.0	4.2
Waupaca	do	1,508	51.8	35.9	8.3	2.2	1.8
Montcalm	Michigan	1,127	54.4	33.0	7.8	3.1	1.7
Grand Traverse	do	1,179	40.6	45.6	10.0	2.4	1.4
Steuben	New York	1,581	24.7	59.0	9.3	2.8	4.2
Monroe	do	1,185	25.4	57.2	11.6	3.6	2.2
Aroostook	Maine	10,391	40.3	47.8	6.2	.5	5.2

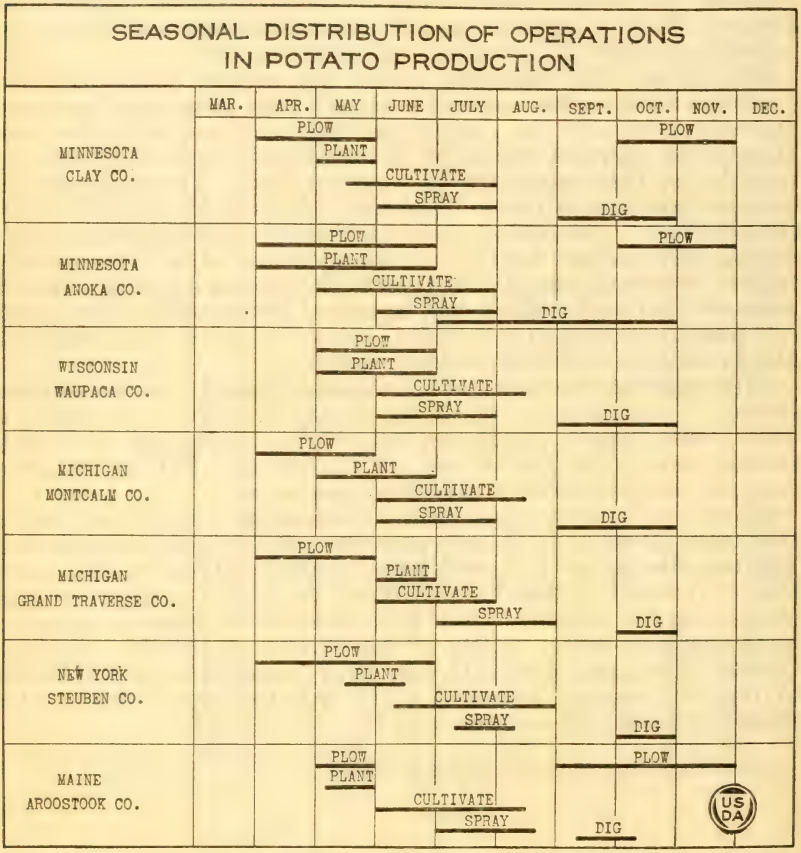

FIG. 7.—May, June, July, and October are the busiest months in the northern potato areas. The several preharvest operations overlap to some extent from farm to farm as well as from season to season, and in Anoka County, Minn., digging the early potatoes may be in progress before the main crop is laid by. Fall plowing is practiced by some growers.

Seasons for various operations.—The months in which the important operations in potato production are generally performed in the different regions are shown in Figure 7. Fall plowing was not generally

practiced outside the Minnesota and Maine areas. In the Anoka area a considerable quantity of potatoes is raised for the early local market, which accounts for the spread of the periods of operations. On the whole, the time for performing the different operations is very similar for all the areas. The major portions of the crops of these regions are available for the market at about the same time. The busiest months in growing potatoes are May, June, July, and October.

MATERIALS.

The items of production costs included under "Materials" are: Manure, seed, fertilizer, spray material, and seed-treatment material.

Manure.—An estimate was secured from each grower as to the number of tons of manure applied to the potato acreage and of the value of the manure at the barn. Manure was commonly applied with a manure spreader of standard size and it was thus not very difficult for the farmer to estimate the quantity applied.

Manure was usually applied to the potato crop. The applications were light in the areas of Clay County, Minn., and Aroostook County, Me., because of the limited supply for the large acreages grown in these areas. However, the application per acre was liberal for the acres covered.

Dairying was an important enterprise in all the areas excepting the Maine area and a large proportion of the manure used was produced on the farm. The value of the manure as given in Table 37 is the value per ton at the barn.

There were a few instances where rye or some other cover crop was sowed in the autumn to be plowed under the following spring as a green manure crop. In these cases the cost of seed and cost of labor of putting in the crop were charged against the potato crop. The plant food and humus value of sod plowed under for potatoes was not charged against the crop. Its value to the potato crop would be difficult to determine with any degree of accuracy, but the importance of a clover sod in the rotation is appreciated by all good farmers.

TABLE 37.—*Quantity and price of manure and fertilizer applied potatoes (1919), 461 farms.*

	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay County.	Anoka County.	Barron County.	Waupaca County.	Montcalm County.	Grand Traverse County.	Steuben County.	Monroe County.	Aroostook County.
Manure:									
Tons per acre	4.6	12.0	14.1	11.0	11.9	9.9	9.0	14.2	3.9
Price per ton	$1.75	$1.42	$1.96	$2.22	$2.37	$2.23	$2.44	$2.10	$2.44
Per cent acres manured	33	87	79	87	93	81	75	90	37
Fertilizer:									
Pounds per acre	0	0	9	0	8	0	128	114	1,965
Price per ton	0	0	$33	0	$26	0	$28	$38	$81
Per cent acres fertilized	0	0	[1]	0	[1]	0	21	29	99

[1] One grower in this area used commercial fertilizer.

Fertilizer.—The purchase price, plus freight paid, was used as the cost of fertilizer. The individual grower has little difficulty in recalling the quantity of fertilizer applied per acre. The hauling was included in the labor charge.

The use of commercial fertilizer was practically limited to the New York and Maine areas. One grower in Barron County, Wis., and one in Montcalm County, Mich., were the only exceptions. In the Maine area a heavy application was used, a ton to the acre being the common rate. A high-grade fertilizer was used in this area as will be noted by the price in Table 37. The usual grade used was 4–8–4.[5] In the other areas acid phosphate was more commonly used.

Seed.—Only a small proportion of the seed used was purchased, as the common practice was to save the seed from the previous year's crop. The value of home-grown seed for purpose of these computations was the market price of seed on the farm at the time of planting.

The charge for seed constitutes from 10 to 16 per cent of the total cost, with an average for all areas of about 12 per cent. The average quantity of seed used per acre was 11.4 bushels for all areas. The large variation in some areas, indicated in Table 38, between the five growers using the least seed and the five using the most seed, per acre, was due mainly to the fact that both hand and machine planting were practiced in these areas, the hand planters using less seed.

TABLE 38.—*Quantity of seed used per acre—Potatoes, 1919 crop, 461 farms.*

	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay County.	Anoka County.	Barron County.	Waupaca County.	Montcalm County.	Grand Traverse County.	Steuben County.	Monroe County.	Aroostook County.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
All farms	12.3	9.5	11.6	10.6	7.7	11.3	11.2	13.2	15.4
Highest five	14.6	12.9	16.2	14.6	11.8	15.0	15.2	16.0	18.4
Lowest five	10.8	6.6	7.1	7.4	5.7	8.5	8.1	10.7	12.1
Average price planting time	$1.02	$1.19	$1.05	$1.16	$.99	$1.05	$1.00	$1.05	$1.43

Many different varieties of potatoes were grown. Many farmers grew more than one variety. Early Ohio and Cobbler were the most common varieties in the area of Clay County, Minn., and early Ohio and Triumph in the area of Anoka County, Minn. Rural New Yorker and Petosky were the important varieties in Barron and Waupaca Counties, Wis., and Montcalm and Grand Traverse Counties, Mich. The Green Mountain was also grown considerably in the Barron County area. The greatest number of varieties grown were in the area of Monroe and Steuben Counties, N. Y., though the leading varieties were Peerless Jr., S. W. Raleigh, and Carman. Cobbler and Green Mountain were the common varieties grown in Aroostook County, Me.

Spray and seed treatment materials.—Aside from the areas of Aroostook County, Me., and Monroe County, N. Y., the spraying was practically limited to poison sprays, Paris green, and other arsenic compounds. In the two areas mentioned Bordeaux mixture was used occasionally. Two and one-half times constituted the average

[5] That is, 4 per cent nitrogen, 8 per cent phosphoric acid, and 4 per cent potash, the order in which plant food formulas are quoted in many sections.

number of sprayings varying from four and one-half times in the Maine area to less than two times in the Clay County, Minn., area. The quantity of posion spray material used per acre varied considerably, ranging from 1 to 3 pounds per acre per spraying. About 2 per cent of the total cost of production was for spray material.

As a very small proportion of the growers visited treated the seed for scab or other skin diseases, this represents a negligible item of cost.

USE OF LAND.

The charge for use of land was determined by obtaining the sale value of the potato land and multiplying it by the prevailing rate of interest on farm mortgages. The charge was determined in this manner, whether the potato land was operated by the owner or rented on the cash or share crop basis, to put the individual farms on the same basis. This item does not include taxes, overhead expenses, and the consumption of fertility. It is the interest charge on land value and thus does not fully represent what might be termed the cash-rent charge. If one prefers not to include the use of land as a cost the charge may be readily eliminated.

The value of the potato land varied considerably on different farms due to location of farm, quality of land, and general improvement on the farm. The average acre-value of the potato land is given in Table 39 with the average for the highest five and the lowest five. In all areas the yields were higher on the higher priced land.

TABLE 39.—*Value per acre of potato land (461 farms), 1919.*

	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay County.	Anoka County.	Barron County.	Waupaca County.	Montcalm County.	Grand Traverse County.	Steuben County.	Monroe County.	Aroostook County.
All farms	$140	$199	$179	$161	$124	$117	$80	$192	$182
Highest five	200	335	249	216	184	176	114	230	266
Lowest five	82	96	115	95	76	67	48	147	100

MACHINERY.

The use of farm machinery on the potato crop was charged at 8 cents per horse hour. This rate was based on the results obtained on detailed cost accounting records on potato farms in different sections of the country and probably represents a fair charge for this item. It includes repairs, depreciation, and interest on the inventory value of the machinery chargeable to the potato crop. It includes all machinery used on the crop. The most common special potato machinery consisted of a one-row two-horse planter, a potato sprayer or duster, and one elevator digger. Where soil and topographic conditions permit, the modern commercial potato grower has these special implements. Ten acres or more of potatoes undoubtedly justify the investment in these implements. Occasionally two or more small growers own a planter or sprayer in partnership.

OVERHEAD.

In addition to items of expense which may be charged directly to the potato crop, there are certain general farm expenses of which the potato crop has to bear its proportionate share. These general expenses include such items as maintenance of buildings, lots, fences, roads, etc.; interest on the value of same; and miscellaneous cash expenses which can not be charged to any one enterprise on the farm. Detailed cost accounting records have established rates for this item and show it as a percentage of the combined labor and material costs. The rates applied in this study were 5 per cent for the Minnesota areas, 6 per cent for the Wisconsin and Michigan areas, and 8 per cent for the New York and Maine areas.

OTHER COSTS.

Taxes and insurance.—The tax and fire insurance charge against the potato crop represents the proportion of the total farm expenses for these items that the potato land capital was of the total farm capital. The estimated total farm capital was obtained for each farm, as were also the total taxes and fire insurance paid, and the potato crop's share was thus readily determined. A few of the growers carried hail insurance and the actual cash cost of this insurance was used as the charge for crop insurance. Taxes and insurance constituted slightly less than 1½ per cent of the total costs.

Bags and barrels.—Containers were needed to carry the crop from field to storage and to market. Potatoes were very seldom shipped in containers. Bags and barrels bought during the year to handle the crops constituted the charge for this item of expense. A few of the growers shipped in bags in the area of Clay County, Minn., resulting in a relatively high charge for bags in this area.

Storage charges.—Some growers had separate potato-storage buildings, and when used wholly for storing potatoes the maintenance of the building was charged to storage. Any purchased fuel used was charged at cost, and if it was wood from the farm it was charged at the prevailing price of cut wood on the farm. Hired storage was charged at actual cost. Many growers store part of the crop in the dwelling or other farm buildings. No separate storage charge was made in such cases, as the overhead expense covered this item. Few potato-storage houses were found outside Clay County, Minn., and Aroostook County, Me. In these two areas, however, about half the growers visited had separate storage houses.

Loss on abandoned potato acreage.—On some farms part of the potato acreage was not harvested because of excessively wet weather, hail, insects, or fungous diseases, or other causes may have made digging not worth while. This charge, then, consists of the expenses on the abandoned acres, including labor, seed, manure, fertilizer, use of land, and other costs. The total cost of all abandoned acreage in a region, divided by the acreage harvested, is the average abandoned acreage cost per acre harvested. No instances were found where crop-insurance payments covered the item of loss on abandoned acreage.

TENURE.

Of the 461 farmers visited, 345, or 75 per cent, owned all of the land they were operating; 63 rented some land in addition to the farms they owned; 45 rented the farms, including the potato land on shares; and 8 rented the farms for cash.

In regions where the tenant and landlord owned the machinery and livestock jointly it was customary for the tenant to furnish the feed and labor and receive half the crop. Where the landlord furnished only the land and seed it was not uncommon for the tenant to receive two-thirds of the crop. The most common sharing of the potato crop was half to landlord and half to tenant. There was, however, a great variation in sharing of expenses, depending upon the arrangement with respect to the other crops grown, the acreage in potatoes, and the quality of the land.

In studying the equitability of any share-rent arrangement in the growing of potatoes, Table 40 should be of assistance. It shows what proportion the cost of each important item is of the total cost. These proportions will vary somewhat from year to year, for individual items, because of variation in value. Adjustments, however, may be made when of sufficient importance to affect results. On individual farms the practices may be considerably different from that shown as an average for the region. With quantities and values given in other tables on which the data given in Table 40 are based, adjustments can be made readily For individual farmers, then, this table should serve as a guide and not as a definite standard for all conditions.

TABLE 40.—*Distribution of the important items of cost in potato production (461 farms), 1919.*

	Minnesota.		Wisconsin.		Michigan.		New York.		Maine.
	Clay County.	Anoka County.	Barron County.	Waupaca County.	Montcalm County.	Grand Traverse. County.	Steuben County.	Monroe County.	Aroostook County.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Man labor	26	25	30	28	28	31	27	24	19
Horse labor	19	19	19	17	20	17	25	23	12
Manure	5	10	13	14	16	13	12	13	2
Seed	16	13	11	14	9	13	12	12	10
Fertilizer	.....	.....	(1)	.....	(1)	.....	2	1	36
Spray material	2	3	3	2	3	2	1	1	2
Use of machinery	7	8	7	7	8	7	8	8	4
Land rent[2]	13	15	12	13	11	10	6	11	6
Overhead	3	3	5	5	5	4	6	6	7
Bags and barrels	5	2	(1)	(1)	(1)	1	1	1	1
Storage	3	1	(1)	(1)	(1)	1	(1)	(1)	1
Other costs	1	1	(1)	(1)	(1)	1	(1)	(1)	(1)
Total costs	100	100	100	100	100	100	100	100	100

[1] Less than half of 1 per cent.

[2] Land rent includes 6 per cent interest on estimated real estate value of the potato land and the proportional share of the taxes and fire insurance.

RELATIONS OF COSTS AND PRICES 1913–1921.

The previous discussions have shown the marked variations from year to year in yields and prices received by farmers for potatoes. With the basic data of production requirements available for 1919,

as well as the cost per unit of labor and materials for different years, it is possible to determine the general trend of costs and prices for different years. Table 41 has been constructed on this basis.

The items which do not vary with yield, such as cultural labor, seed, fertilizer, and overhead, are assumed to be the same from year to year, varying only with the cost per unit. Harvesting and marketing labor and containers were increased or decreased according to the yields. The prices applied to these data were average prices for the State as reported by the Bureau of Crop Estimates, as were also the yields and prices received per bushel. The data in Table 41 should, therefore, not be taken as absolute costs but as trends of costs.

TABLE 41.—*Trend of cost per acre, cost per bushel, and price per bushel received, 1913–1921.*

Year.	Minnesota.			Wisconsin.			Michigan.			New York.			Maine.		
	Cost.		Price per bush.	Cost.		Price per bush.	Cost.		Price per bush.	Cost.		Price per bush.	Cost.		Price per bush.
	Per acre.	Per bush.		Per acre.	Per bush.		Per acre.	Per bush.		Per acre.	Per bush.		Per acre.	Per bush.	
1921	$52	$0.58	$1.02	$67	$0.68	$1.22	$61	$0.60	$1.19	$82	$0.72	$1.24	$186	$0.61	$0.97
1920	149	1.32	.78	155	.98	.84	129	.94	.78	152	1.08	.92	284	1.50	.84
1919[1]	83	.80	2.15	98	.72	1.99	87	.74	2.04	107	.87	2.07	220	.79	1.86
1918	72	.58	.79	86	.54	.87	74	.68	1.04	94	.86	1.28	194	.92	1.16
1917	102	.76	.82	107	.65	.80	92	.74	.92	94	.90	1.19	194	1.47	1.26
1916	52	.72	1.58	58	.85	1.70	55	.89	1.84	70	.90	1.92	141	.65	1.73
1915	47	.37	.51	51	.40	.58	44	.58	.67	53	.77	.89	106	.56	.80
1914	48	.36	.37	56	.31	.37	51	.33	.36	67	.41	.48	117	.43	.35
1913	43	.33	.50	51	.32	.53	46	.38	.55	56	.67	.82	107	.46	.55

[1] For 1919 cost per acre and per bushel as obtained in this investigation, see Table 8.

Probably the most striking thing shown by this table is the marked variation in costs for successive years. The costs are usually high when the price received is low, and vice versa. Tables 42 and 43 are shown to point out the variation in two of the important contributing costs—seed and labor. The years with outstanding high seed-potato prices were 1914, 1917, and 1920, as shown in Table 42. By referring to Table 41 it will be observed that these were the years when the price received for the crop was relatively low per bushel. Similarly, in years when the seed cost was relatively low the margin between the cost of production and the price received was greatest. The grower who contemplates changing his acreage materially when seed prices are relatively high or low should carefully study acreage, yields, and prices in previous years when similar conditions prevailed, to see what normally may be expected before making his decision.

TABLE 42.—*Seed potatoes, May 1, farm price per bushel.*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Minnesota	$0.26	$0.51	$0.41	$0.68	$2.51	$0.48	$0.86	$3.84	$0.42
Wisconsin	.28	.52	.34	.77	2.79	.49	1.04	3.82	.40
Michigan	.32	.57	.27	.83	2.82	.57	1.05	3.60	.29
New York	.59	.82	.36	1.10	3.05	.84	1.21	3.51	.41
Maine	.40	.64	.30	.96	2.65	.90	1.00	3.35	.46

TABLE 43.—*Monthly labor rate with board.*

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Minnesota	$28.90	$28.70	$28.80	$33.00	$39.00	$47.10	$53.70	$67.00	$37.00
Wisconsin	28.10	28.00	28.50	31.00	36.00	43.50	48.70	62.00	39.20
Michigan	24.90	24.70	25.10	28.40	34.00	37.50	42.00	53.00	34.30
New York	25.50	25.40	25.40	29.40	35.00	40.00	43.30	54.40	40.00
Maine	25.50	26.30	26.50	29.00	36.00	46.50	49.40	56.60	40.00

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

February 27, 1924.

Secretary of Agriculture	HENRY C. WALLACE.
Assistant Secretary	HOWARD M. GORE.
Director of Scientific Work	E. D. BALL.
Director of Regulatory Work	WALTER G. CAMPBELL.
Director of Extension Work	C. W. WARBURTON.
Solicitor	R. W. WILLIAMS.
Weather Bureau	CHARLES F. MARVIN, *Chief.*
Bureau of Agricultural Economics	HENRY C. TAYLOR, *Chief.*
Bureau of Animal Industry	JOHN R. MOHLER, *Chief.*
Bureau of Plant Industry	WILLIAM A. TAYLOR, *Chief.*
Forest Service	W. B. GREELEY, *Chief.*
Bureau of Chemistry	C. A. BROWNE, *Chief.*
Bureau of Soils	MILTON WHITNEY, *Chief.*
Bureau of Entomology	L. O. HOWARD, *Chief.*
Bureau of Biological Survey	E. W. NELSON, *Chief.*
Bureau of Public Roads	THOMAS H. MACDONALD, *Chief.*
Bureau of Home Economics	LOUISE STANLEY, *Chief.*
Office of Experiment Stations	E. W. ALLEN, *Chief.*
Fixed Nitrogen Research Laboratory	F. G. COTTRELL, *Director.*
Publications	L. J. HAYNES, *In Charge.*
Library	CLARIBEL R. BARNETT, *Librarian.*
Federal Horticultural Board	C. L. MARLATT, *Chairman.*
Insecticide and Fungicide Board	J. K. HAYWOOD, *Chairman.*
Packers and Stockyards Administration *Grain Futures Administration*	CHESTER MORRILL, *Assistant to the Secretary.*

This bulletin is a contribution from

Bureau of Agricultural Economics	HENRY C. TAYLOR, *Chief.*
Division of Farm Management	H. R. TOLLEY, *In Charge.*
Cost of Production Division	R. H. WILCOX, *In Charge.*

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
10 CENTS PER COPY

▽